JMA-3300Series

MARINE RADAR EQUIPMENT

FIELD SERVICE MANUAL

JRC Japan Radio Co., Ltd.

CONTENTS

Chapter 1 Equipment Overview

1.1 Overview

This equipment is a marine radar equipment consisting of a scanner unit and an integrated color LCD display unit. The radar equipment consists of a scanner unit that generates transmitting signals, transmits and receives radio waves, and amplifies receiving signals, and a display system that displays radar images after removing unwanted radio wave from the radar signals.

The radar equipment with which a magnetron tube is used as the transmitting tube transmits 9.4 GHz (X band) pulse-modulated waves.

In addition to the basic radar functions, the radar equipment has functions for safe navigation such as a radar trail display function, target tracking function, and AIS information display function.

1.2 Scanner Unit

The scanner unit is an antenna that transmits a radar signal into space, and sends the radar signal reflected from a target into the equipment. The horizontal antenna beam width is small for identifying the target bearing, and the scanner unit has a rotating mechanism for detection in the entire surrounding area.

Some scanner units are provided for this equipment, and their usage is as follows:

①X band (4 kW) scanner unit: Compact and light weight
②X band (6 kW) scanner unit: Compact and light weight
③X band (10 kW) scanner unit: Compact and light weight
④X band (25 kW) scanner unit: High resolution, and high sensitivity

Figure 1.2-1 X-4 kW Scanner Unit



Figure 1.2-2　X-6 kW Scanner Unit



Figure 1.2-3　X-10 kW Scanner Unit



Figure 1.2-4　X-25 kW Scanner Unit



1.3 Display Unit

The display unit processes a radar signal transmitted from the scanner unit, removes unwanted radio wave, and plots/displays radar images in a specified observation range.
The user is to stand in front of the display unit and observe the conditions around the own ship with the radar images displayed on the display unit by operating the cursor keys and the MULTI control on the operation panel.
The display unit is shown below.

Figure 1.3-1 Display Unit (NCD-2182)



1.4 Principal Functions

This equipment has the following functions:

①Sensitivity adjustment, and sea clutter and rain/snow clutter suppression

②Interference rejecter

③Navigation tools (cursor, VRM, EBL and parallel cursor)

④Own track display

⑤Radar trail display

⑥Target tracking

⑦AIS information display

⑧Self-diagnostic function

Chapter 2
Equipment Configuration

2.1 Configuration

2.1.1 Scanners and Transmitted Output Powers

Model number	Scanner	Transmitted output power	Band	Rate of rotation
JMA-3314	620 mm Radome	4 kW	X	27 rpm
JMA-3316	3.9 FT SLOT ANTENNA	6 kW	X	27 rpm
JMA-3316HS	3.9 FT SLOT ANTENNA	6 kW	X	48 rpm
JMA-3334	620 mm Radome	4 kW	X	48 rpm
JMA-3336	3.9 FT SLOT ANTENNA	6 kW	X	27 rpm
JMA-3336HS	3.9 FT SLOT ANTENNA	6 kW	X	48 rpm
JMA-3340-4	4 FT SLOT ANTENNA	10 kW	X	27 rpm
JMA-3340-4HS	4 FT SLOT ANTENNA	10 kW	X	48 rpm
JMA-3340-6	6 FT SLOT ANTENNA	10 kW	X	27 rpm
JMA-3340-6HS	6 FT SLOT ANTENNA	10 kW	X	48 rpm
JMA-3355-7	7 FT SLOT ANTENNA	25 kW	X	24 rpm
JMA-3355-9	9 FT SLOT ANTENNA	25 kW	X	24 rpm

* Type of transmitted radio wave: P0N for all the models

2.1.2 Radar Configuration and Ship's Mains

Model number	Scanner	Display unit	Ship's mains
JMA-3314	NKE-2042	NCD-2182	12/24 VDC
JMA-3316	NKE-2062	NCD-2182	12/24 VDC
JMA-3316HS	NKE-2062HS	NCD-2182	24 VDC
JMA-3334	NKE-2042	NCD-2182	12/24 VDC
JMA-3336	NKE-2063	NCD-2182	12/24 VDC
JMA-3336HS	NKE-2063HS	NCD-2182	24 VDC
JMA-3340-4	NKE-2103-4	NCD-2182	24 VDC
JMA-3340-4HS	NKE-2103-4HS	NCD-2182	24 VDC
JMA-3340-6	NKE-2103-6	NCD-2182	24 VDC
JMA-3340-6HS	NKE-2103-6HS	NCD-2182	24 VDC
JMA-3355-7	NKE-2254-7	NCD-2182	24 VDC
JMA-3355-9	NKE-2254-9	NCD-2182	24 VDC

Note:

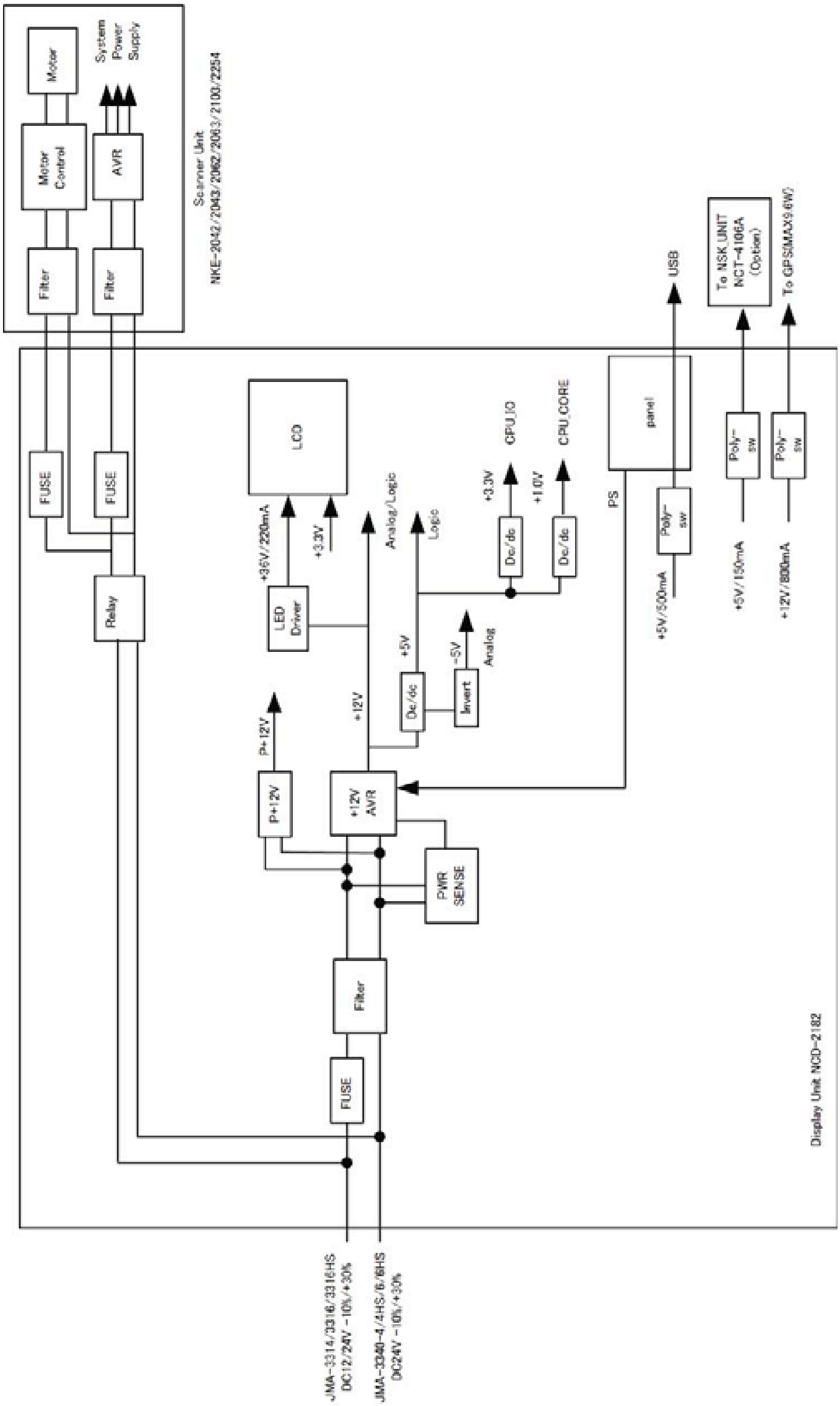
A scanner unit and display unit are indicated on the nameplate of the equipment as follows:

Scanner unitSCANNER UNIT

Display unitDISPLAY UNIT

2.2 Power System Diagram

Figure 2.2-1 JMA-3300 Power System Diagram



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2.3 Functional System Diagram

2.3.1 Scanner Unit

Figure 2.3-1 Functional System Diagram of Scanner Unit

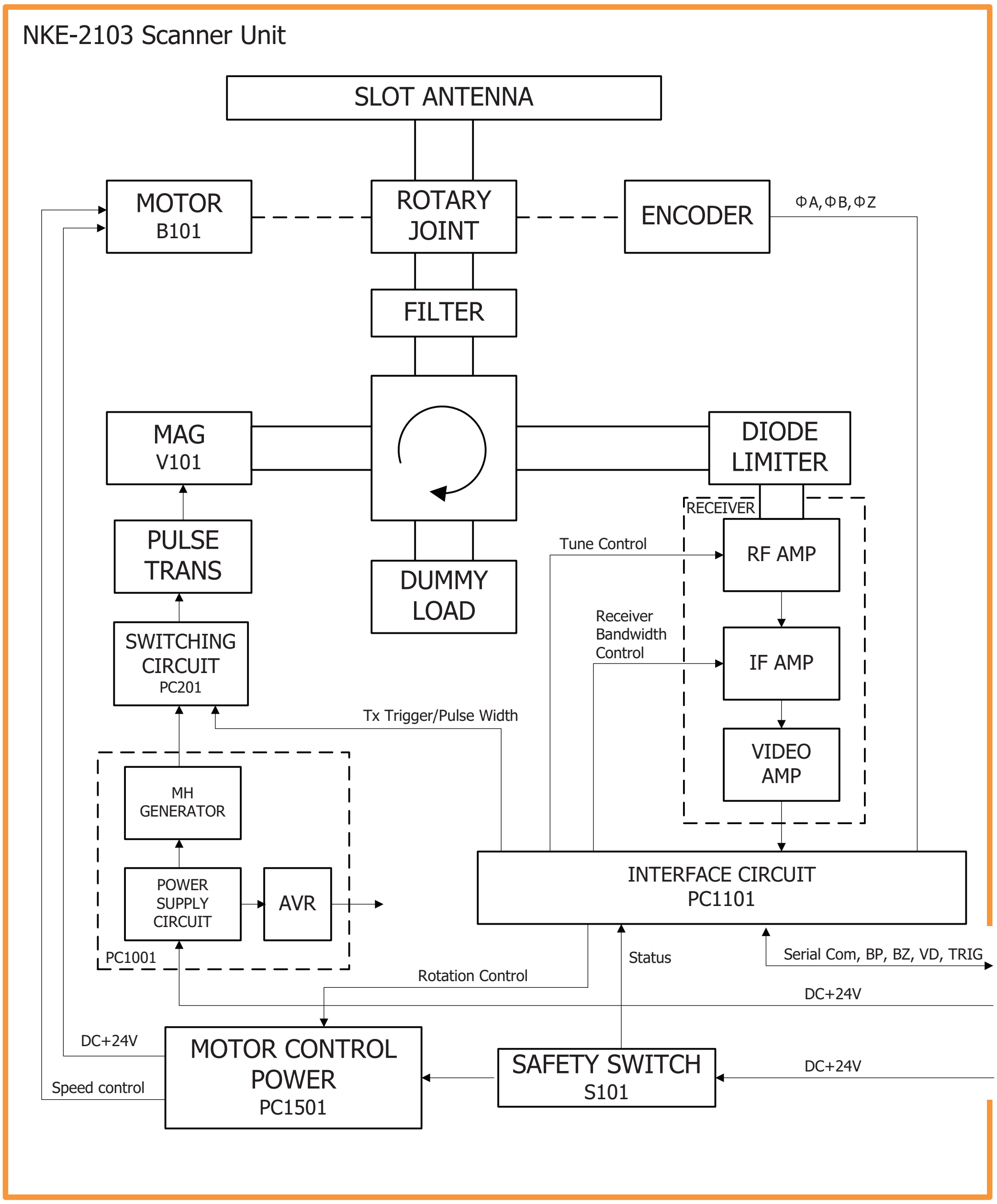


Figure 2.3-1 shows the functional system diagram of the scanner unit for this equipment.

When the power relay for the scanner unit in the display unit is turned on and power is supplied to the scanner unit, the power circuit starts power supply to each circuit of the scanner unit. The CPU in the interface circuit is started by starting the power supply, and preheating of the magnetron is started after initialization. The scanner unit waits for a communication signal from the display unit. A communication link is established when a communication signal is received, and then the scanner unit is placed under control of the display unit.

While the magnetron is being preheated, the interface circuit sets the operation of each circuit of the scanner unit according to the initial setting value transmitted by the display unit. After completion of preheating, the scanner unit informs the display unit that the preheating is complete. When the operator performs operation to start transmission, a transmission start command is sent through the communication line from the display unit, and the scanner unit starts the scanner motor and the transmission.

A transmission timing pulse is generated in the interface circuit and input to the modulator switching circuit. After high-voltage switching for the modulator, the high-voltage pulse is further boosted by the pulse transformer and applied to the magnetron for obtaining pulse-modulated microwave. The radar-signal pulse width and repetition frequency are specified by a control command from the display unit.

The radar signal passes through the duplexer circuit configured with the circulator and the rotary joint and transmitted into space from the antenna.

A signal reflected from a target is input through the antenna, and then input to the receiving block by the duplexer function. After the received signal is amplified, it is converted to IF frequency and log-detected, and turns into a radar video signal. If the receiving tuning function is in automatic mode, the interface circuit processes the received signal and automatically controls the tuning voltage to obtain optimum local frequency.

The motor power circuit controlled by the interface circuit is turned on, DC power is supplied to the motor driver circuit, and the motor starts running. The rotation control signal output by the interface circuit is supplied to the motor driver circuit after frequency-voltage conversion in the motor power circuit, by which the motor speed is controlled. When the safety switch is turned off, power supply to the motor driver is forcibly turned off, by which the motor is stopped. The radiation bearing of scanner beam is detected by the encoder.

The received radar video signal, transmission timing signal, and antenna rotation signal are sent to the display unit. The radar video signal is a non-processed, log-compressed signal. The antenna rotation signal is an incremental signal, and 2048 rotation pulses and reference bearing pulses per cycle are used.

When a specified time has passed during the stopping of the communication signal from the display unit, the interface circuit moves into the protection mode, and forcibly stops the transmission and the scanner unit.

2.3.2 Display Unit

Figure 2.3-2 Functional System Diagram of Display Unit

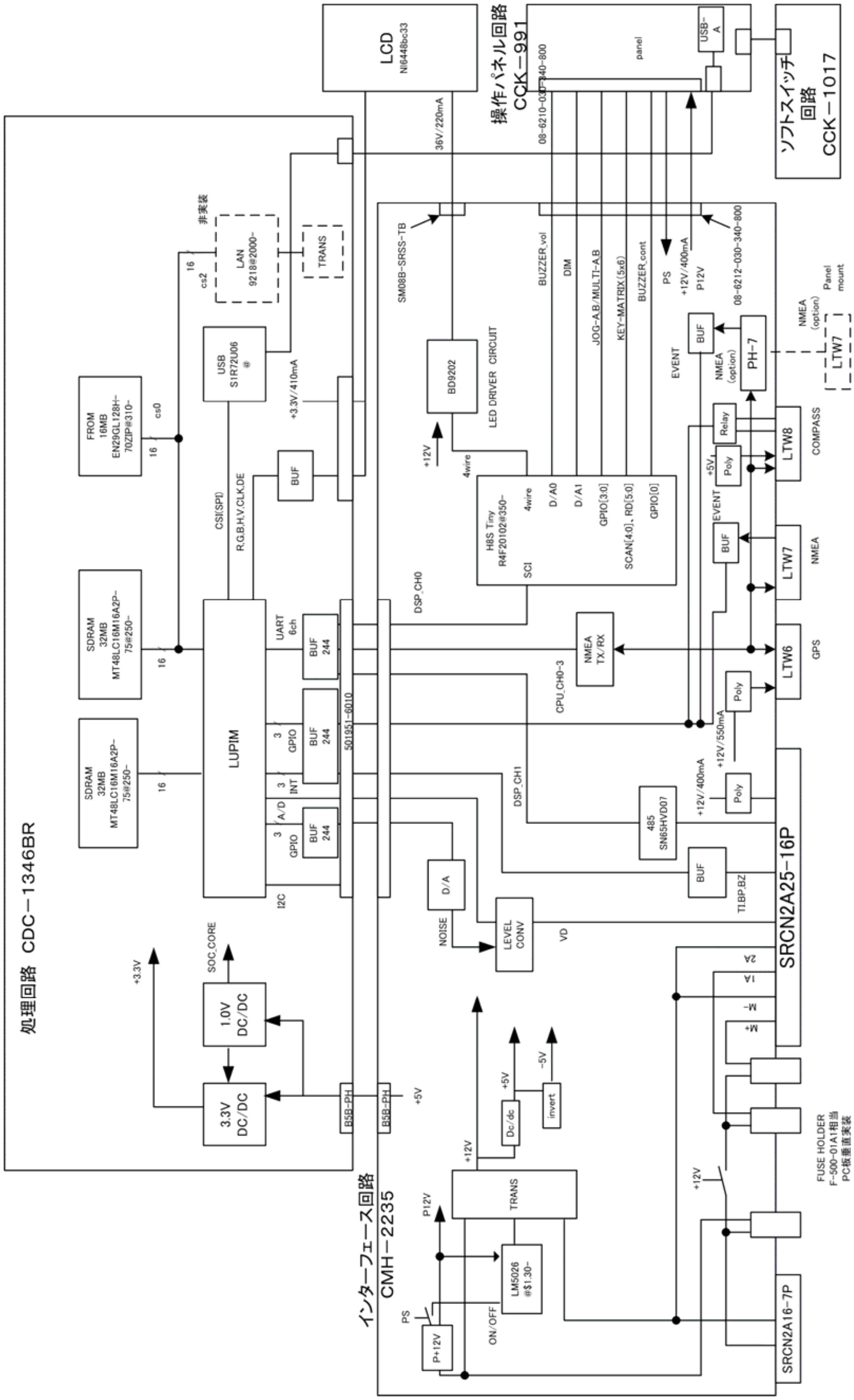


Figure 2.3-2 shows the functional system diagram of the display unit for this equipment.

2.4 Input/Output Specifications

This section explains the signals to be connected to connectors in the I/F circuit CMH-2235.

2.4.1 POWER (J1)

This is used for connection with the power supply.

PIN	NAME	DESCRIPTION	APPLICATION
1	1A		
2	1A		
3	1A		
4			
5	2A		
6	2A		
7	2A		

2.4.2 SCANNER (J2)

This is used for connection with the scanner unit.

PIN	NAME	DESCRIPTION	APPLICATION
1	M-		TXRX
2	M-		
3	M+		
4	M-		
5	2A		
6	GND		
7	VDE		
8	+12V		
9	1A		
10	VD		
11	MTR+		
12	BZ		
13	MTR-		
14	TRGE		
15	TRG		
16	BP		

2.4.3 GPS (J3)

This is used for connection with the GPS.

PIN	NAME	DESCRIPTION	APPLICATION
1	+12V	Used for direct connection with a JRC GPS receiver	GPS
2	GND	Same as above	
3	GPSRX-	Data return	
4	GPSRX+	Data input	
5	GPSTX+	Used for direct connection with a JRC GPS receiver	
6	NC		

2.4.4 NMEA (J4)

This is used for connection with the AIS or external navigator.

*) If the AIS is connected, other NMEA equipment cannot be connected.

PIN	NAME	DESCRIPTION	APPLICATION
1	NAVTX+	Signal (+) transmitted to external equipment	
2	NAV1TX-	Signal (-) transmitted to external equipment	
3	NAVRX+	Signal (+) received from external equipment	
4	NAV1RX-	Signal (-) received from external equipment	
5	GND	GND	
6	EVENT+	Dry contact input 1	Own ship's position mark
7	EVENT-	Dry contact input 2	Own ship's position mark

2.4.5 HDG (J5)

This is connected when a bearing signal is input to the radar.

PIN	NAME	DESCRIPTION	APPLICATION
1	NSKTX+	Signal (+) transmitted to the NSK	
2	NSKTX-	Signal (-) transmitted to the NSK	
3	NSKRX+	Signal (+) received from the NSK, GPS compass, or another bearing sensor (NMEA)	
4	NSKRX-	Same as above (-)	
5	GND	Power GND for NSK	
6	ALM+	Dry contact output 1	External-buzzer connection
7	ALM-	Dry contact output 2	External-buzzer connection
8	+5V	Power supply (+5 V) for the NSK	

2.5 DIP-SW/Jumper Setting

2.5.1 I/F Circuit CMH-2235

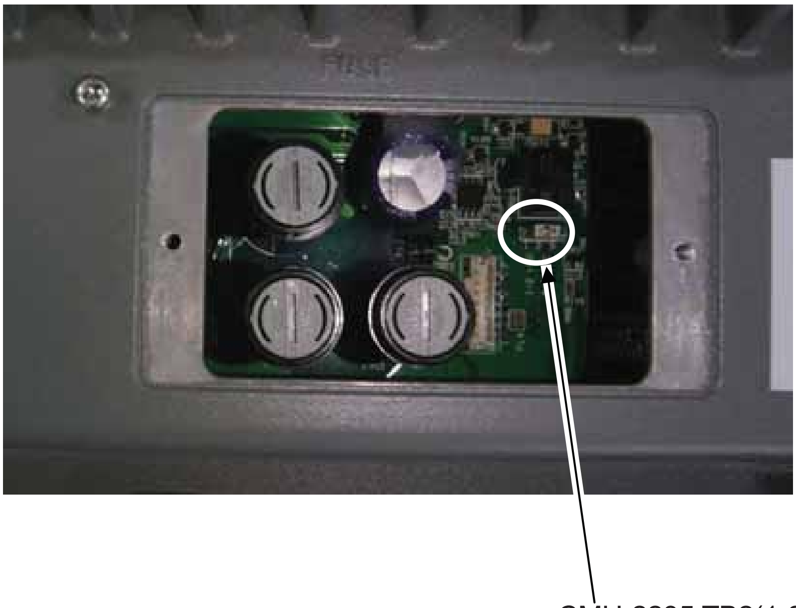
■ Jumper setting

A jumper post is installed at the location indicated in the figure below.

If an external buzzer is connected to the pin J5, use the jumper TB2 to determine whether to open or close the buzzer contact in accordance with the status of use under normal conditions.

Normally open contact when the pins 1-2 are jumpered (factory setting)

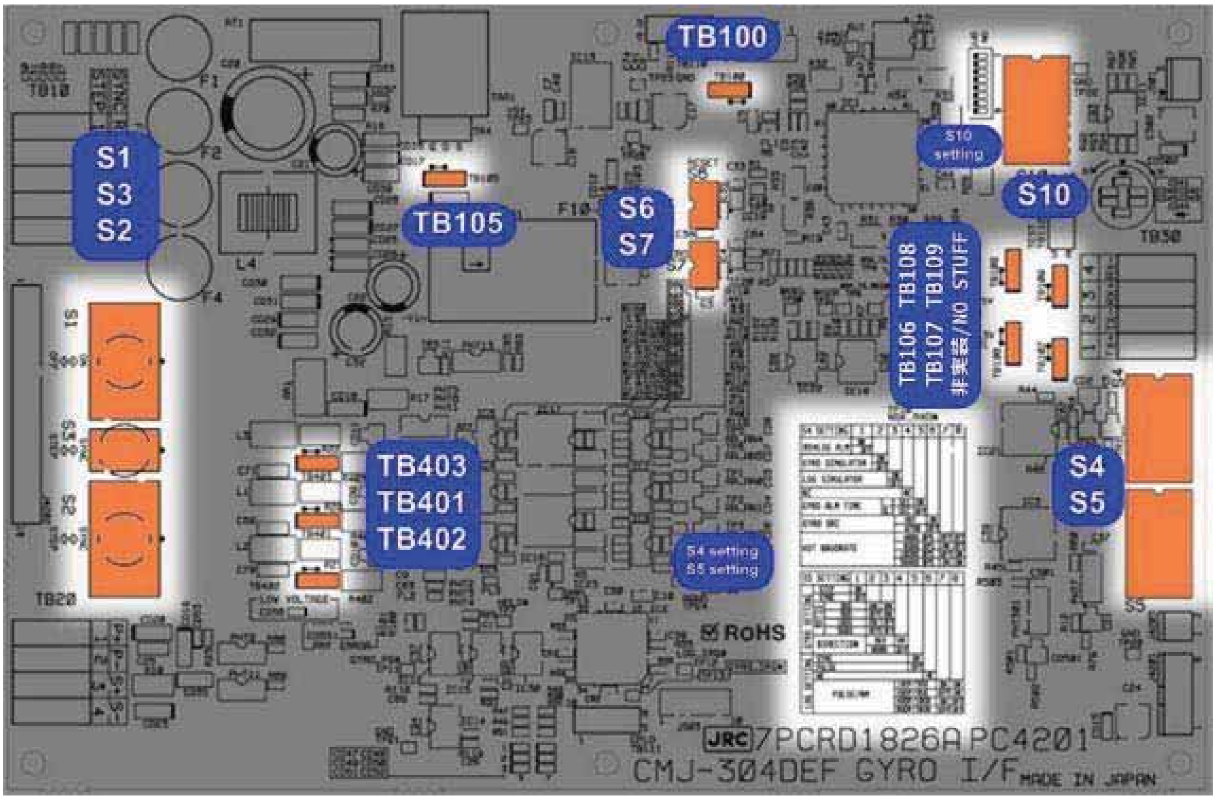
Normally closed contact when the pins 2-3 are jumpered



CMH-2235 TB2(1-2) short-circuit

2.5.2 GYRO I/F Circuit CMJ-304E

■ DIP-SW/jumper setting



(1) TB100Not to be used. Leave the factory setting as is.

(2) TB105: Availability of setting if input voltage for the gyro is low

1-2: Ordinary setting (factory setting)

2-3: Setting when voltage for the gyro is low (CD56 is lighted when the voltage is 22 VDC or less. Even when the display system is turned off, the JMA-3300 operates receiving power from the display unit side. Thus, the switching of TB105 setting is not necessary. (This switching does not cause any problem.))

Note:

- Use this setting only when voltage is low.
  Do not use this with synchro setting.
  Note that incorrect settings can lead to damage of the NSK unit.

(3) TB106 and TB107: Not installed

(4) TB108 and TB109: Not installed

(5) TB401-TB403: Availability of setting if input voltage for the gyro is low

1-2Ordinary operation

(6) S4 and S5: Gyro setting and log setting

S5 SETTING TABLE			1	2	3	4	5	6	7	8
GYRO SIGNAL	STEP		ON							
GYRO SIGNAL	SYNC		OFF							
GYRO SIGNAL	360X			OFF	OFF					
GYRO SIGNAL	180X			ON	OFF					
GYRO SIGNAL	90X			OFF	ON					
GYRO SIGNAL	36X			ON	ON					
GYRO SIGNAL	DIRECTION	NOR				OFF				
GYRO SIGNAL	DIRECTION	REV				ON				
LOG SIGNAL	TYPE	PULSE					OFF			
LOG SIGNAL	TYPE	SYNC					ON			
LOG SIGNAL	Don't care							OFF		
LOG SIGNAL	PULSE/NM	800P／360X							OFF	OFF
LOG SIGNAL	PULSE/NM	400P／180X							ON	OFF
LOG SIGNAL	PULSE/NM	200P／90X							OFF	ON
LOG SIGNAL	PULSE/NM	100P／30X							ON	ON

S4 SETTING TABLE			1	2	3	4	5	6	7	8
OTHER SETTING	LOG ALARM		ON							
OTHER SETTING	LOG ALARM		OFF							
OTHER SETTING	GYRO SIMULATOR			ON						
OTHER SETTING	GYRO SIMULATOR			OFF						
OTHER SETTING	LOG SIMULATOR				ON					
OTHER SETTING	LOG SIMULATOR				OFF					
OTHER SETTING	N.C.		Don't care			any				
OTHER SETTING	GYRO ALARM TIME	5s					ON			
OTHER SETTING	GYRO ALARM TIME	0.5s					OFF			
OTHER SETTING	HEADING SENSOR SOURCE	NMEA(HDT/THS)						ON		
OTHER SETTING	HEADING SENSOR SOURCE	GYRO SIGNAL						OFF		
OTHER SETTING	NMEA BAUDRATE SETTING	4800							OFF	OFF
OTHER SETTING	NMEA BAUDRATE SETTING	9600							ON	OFF
OTHER SETTING	NMEA BAUDRATE SETTING	19200							OFF	ON
OTHER SETTING	NMEA BAUDRATE SETTING	38400							ON	ON

(7) S6: Reset switch

Resets the CPU.

(8) S7: Zero-degree setting switch

Sets, as the due north, the bearing at the point of pressing.

(9) S2 and S3: Selection of a gyro type

Left:Step

Right:Synchro

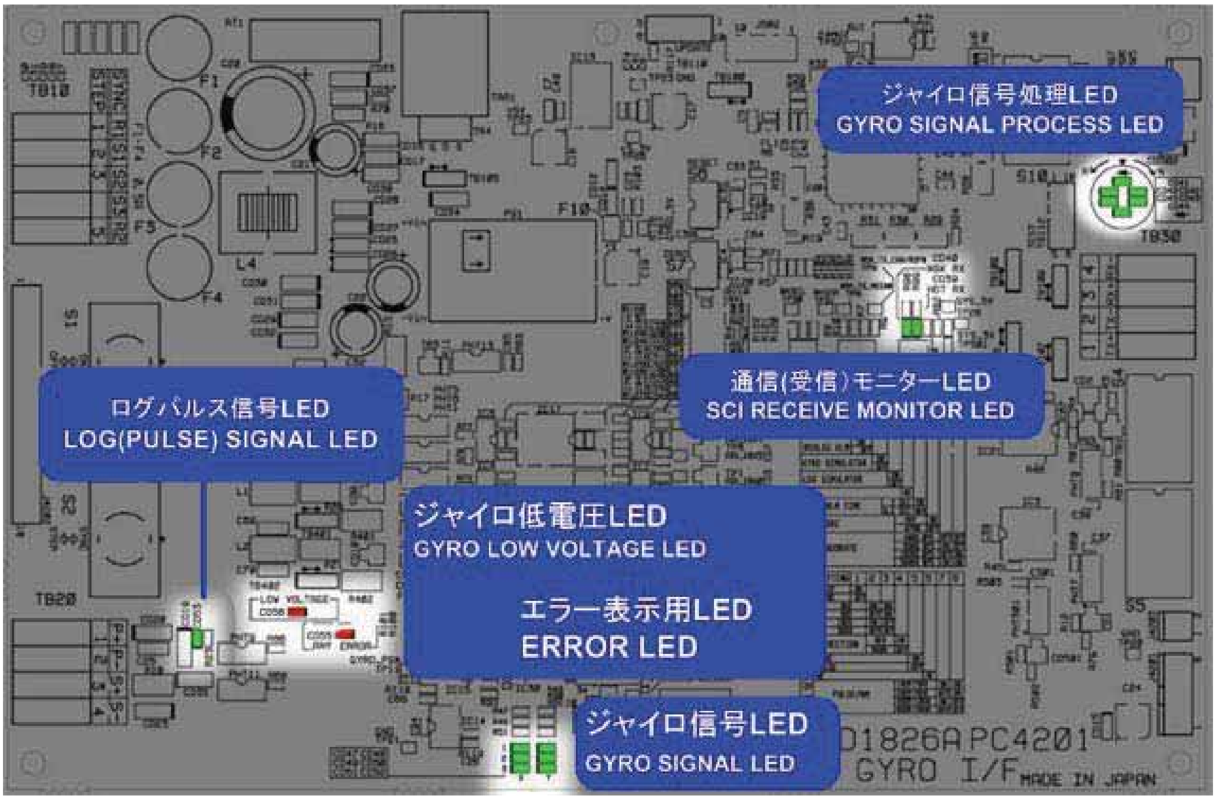
(10) S1: Gyro ON-OFF switch

Left:OFF

Right:ON

(11) S10: Other settings are not to be used. Set all to OFF.

■ LED



2.5.3 Processing Circuit CDC-1346BR

(1) S1: DIP-SW. All the bits are factory-set to OFF.

Do not change any of the factory settings.

1:OFF (Do not change this setting.)

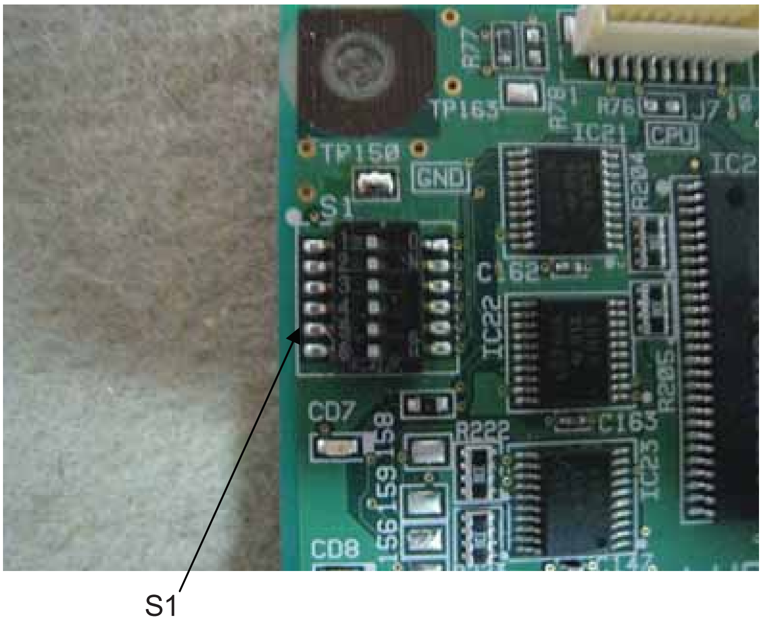
2:OFF (Do not change this setting.)

3:OFF (Do not change this setting.)

4:OFF (Do not change this setting.)

5:OFF (Do not change this setting.)

6:OFF (Do not change this setting.)



2.5.4 T/R Control Circuit CMC-1205R

[Type of DIP switch]

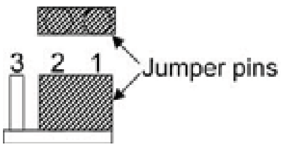
- SW1, SW2

[Type of jumper pin]

- J92, J93, J95, J96

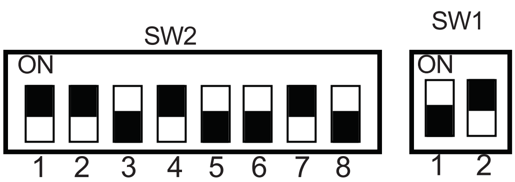
● NKE-2254 (2 units: 25 kW, X-band)

- Jumper pin setting



J92,J93,J95,J96: 1-2 jumpered

- DIP switch setting (■: Switch)



Chapter 3 Service Parts

3.1 Service Parts Lists for the Units

3.1.1 Included accessories

Table 3.1-1 7ZXRD0012 (JMA-3314)

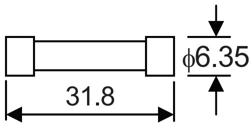
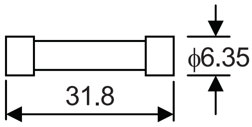
Name/ Model	Parts No.	Code	Shape (mm)	Quantity	Location	Application
Fuse ST4-6.3AN1	F2	5ZFCA00051		4	Inside processing unit	Modulator For 12 VDC
Fuse ST4-3.15AN1	F2	5ZFCA00047		4	Inside processing unit	Modulator For 24 VDC

Table 3.1-2 7ZXRD0012 (JMA-3334)

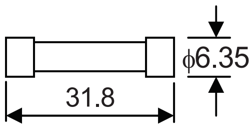
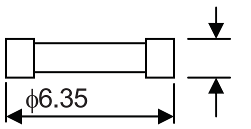
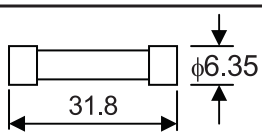
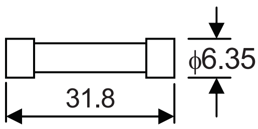
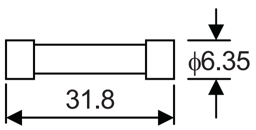
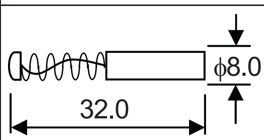
Name/Type	Parts No.	Code	Shape (mm)	Quantity	Location	Application
Fuse ST4-6.3AN1	F2	5ZFCA00051		4	Inside processing unit	Modulator For 12 VDC
Fuse ST4-3.15AN1	F2	5ZFCA00047		4	Inside processing unit	Modulator For 24 VDC

Table 3.1-3 7ZXRD0013 (JMA-3316/HS)

Name/ Model	Parts No.	Code	Shape (mm)	Quantity	Location	Application
Fuse ST4-6.3AN1	F2	5ZFCA00051		4	Inside processing unit	Scanner Unit NKE-2062 Modulator For 12 VDC
Fuse ST4-3.15AN1	F2	5ZFCA00047		4	Inside processing unit	Scanner Unit NKE-2062 Scanner Unit NKE-2062HS Modulator For 24 VDC
Fuse ST4-5AN1	F3	5ZFCA00050		4	Inside processing unit	Scanner Unit NKE-2062 Scanner Unit NKE-2062HS For Scanner Unit motor
Motor brush 54531-01	–	BRXP05247		2	Scanner Unit motor	

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Table 3.1-4 7ZXRD0013 (JMA-3336/HS)

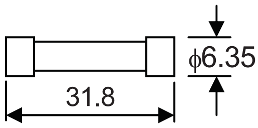
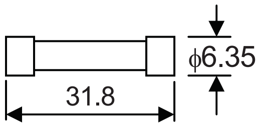
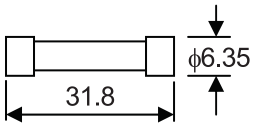
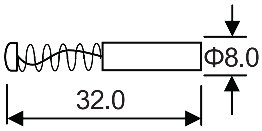
Name/Type	Parts No.	Code	Shape (mm)	Quantity	Location	Application
Fuse ST4-6.3AN1	F2	5ZFCA00051		4	Inside processing unit	Scanner Unit NKE-2063 Modulator For 12 VDC
Fuse ST4-3.15AN1	F2	5ZFCA00047		4	Inside processing unit	Scanner Unit NKE-2063 Scanner Unit NKE-2063HS Modulator For 24 VDC
Fuse ST4-5AN1	F3	5ZFCA00050		4	Inside processing unit	Scanner Unit NKE-2063 Scanner Unit NKE-2063HS For Scanner Unit motor
Carbon brush 54531-01	–	BRXP05247		2	Scanner	For the scanner motor

Table 3.1-5 7ZXRD0026 (JMA-3340-4/4HS/6/6HS)

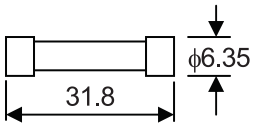
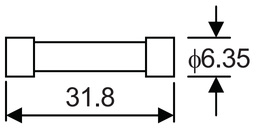
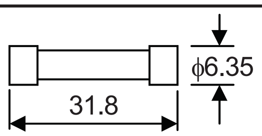
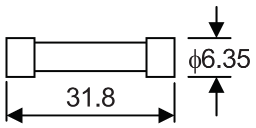
Name/ Model	Parts No.	Code	Shape (mm)	Quantity	Location	Application
Fuse ST4-5AN1	F2	5ZFCA00050		4	Inside processing unit	For Scanner Unit motor
Fuse ST6-10AN1	F3	5ZFCA00053		4	Inside processing unit	For Scanner Unit power supply

Table 3.1-6 7ZXRD0015 (JMA-3355-7/9)

Name/ Model	Parts No.	Code	Shape (mm)	Quantity	Location	Application
Fuse ST6-10AN1	F2	5ZFCA00053		4	Inside processing unit	Scanner Unit For motor
Fuse ST6-10AN1	F3	5ZFCA00053		4	Inside processing unit	For Scanner Unit power supply

3.1.2 Special parts

Table 3.1-7 NKE-2042 (JMA-3314)

Parts No.	Name	Type	Code	Manufacturer	Location
V201	Magnetron	MSF1421B	5VMAA00049	NJRC	Scanner Unit
A101	Circulator	FCX68	6AJRD00001	Toshiba	Scanner Unit
A102	Diode Limiter	NJS6930	5EZAA00024	NJRC	Scanner Unit

Table 3.1-8 NKE-2043 (JMA-3334)

Parts No.	Name	Type	Code	Manufacturer	Location
V101	Magnetron	MSF1421B	5VMAA00092	NJRC	Scanner
A101	Circulator	FCX68R	5AJIX00027	Orient Microwave	Scanner
A102	Diode Limiter	NJS6930	5ATBT00006	NJRC	Scanner

Table 3.1-9 NKE-2062 (JMA-3316/HS)

Parts No.	Name	Type	Code	Manufacturer	Location
V101	Magnetron	MSF1422B	5VMAA00068	NJRC	Scanner Unit
A101	Circulator	FCX68	6AJRD00001	Toshiba	Scanner Unit
A102	Diode Limiter	NJS6930	5EZAA00024	NJRC	Scanner Unit

Table 3.1-10 NKE-2063 (JMA-3336)

Parts No.	Name	Type	Code	Manufacturer	Location
V101	Magnetron	MSF1422B	5VMAA00090	NJRC	Scanner
A101	Circulator	FCX68R	5AJIX00027	Orient Microwave	Scanner
A102	Diode Limiter	NJS6930	5ATBT00006	NJRC	Scanner

Table 3.1-11 NKE-2103 (JMA-3340-4/4HS/6/6HS)

Parts No.	Name	Type	Code	Manufacturer	Location
V101	Magnetron	MAF1565N	5VHAA00102	NJRC	Scanner Unit
A101/A102	Circulator	FCX68R	5AJIX00027	Orient Microwave	Scanner Unit
A103	Dummy	NJC4002	5ANDF00001	NJRC	Scanner Unit
A104	Filter	NJC9952	5AWAX00002	NJRC	Scanner Unit
A301	Diode Limiter	NJS6930	5ATBT00006	NJRC	Scanner Unit

Table 3.1-12 NKE-2254 (JMA-3355-7/9)

Parts No.	Name	Type	Code	Manufacturer	Location
V1	Magnetron	M1568BS	5VMAA00106	NJRC	Scanner Unit
A101/A102	Circulator	NJC3901M	5AJBV00007	NJRC	Scanner Unit
A103	Dummy	NJC4002	5ANDF00001	NJRC	Scanner Unit
A104	Filter	NJC9952	5AWAX00002	NJRC	Scanner Unit
A301	Diode Limiter	NJS6930	5ATBT00006	NJRC	Scanner Unit

3.1.3 Repair Circuit Block

Table 3.1-13 NKE-2042 (JMA-3314)

Location	Circuit Block	Type	Remarks
Scanner Unit	Motor Unit	7BDRD0023*	
Scanner Unit	Modulation circuit	CME-322	
Scanner Unit	Receiver	CAE-475	

"*" means revision, such as A, B and so on.

Table 3.1-14 NKE-2043 (JMA-3334)

Circuit Block	Type	RoHS	Remarks
Motor Unit	7BDRD0052*	○	
Compound Modulator Circuit	CME-385	○	
Receiver	NRG-239	○	Including CAE-548

"*" means revision, such as A, B and so on.

Table 3.1-15 NKE-2062 (JMA-3316/HS)

Location	Circuit Block	Type	Remarks
Scanner Unit	Motor with gear	CBP-169	DC brushless
Scanner Unit	Modulation circuit	CME-339	Excluding Magnetron
Scanner Unit	Receiver	NRG-226	Including CAE-475-1

Table 3.1-16 NKE-2063 (JMA-3336)

Circuit Block	Type	RoHS	Remarks
Motor Unit	CBP-218	○	
Compound Modulator Circuit	CME-386	○	
Receiver	NRG-239	○	Including CAE-548

Table 3.1-17 NKE-2103 (JMA-3340-4/4HS/6/6HS)

Location	Circuit Block	Type	Remarks
Scanner Unit	Motor with gear	7BDRD0048	DC brushless
Scanner Unit	Modulation circuit	CME-363	Excluding Magnetron
Scanner Unit	Receiver	NRG-610	Including CAE-529-1
Scanner Unit	Power supply circuit	CBD-1783	
Scanner Unit	Encoder	CHT-71A	
Scanner Unit	Motor control power circuit	CBD-1779	
Scanner Unit	Fan	7BFRD0002	

Table 3.1-18 NKE-2254 (JMA-3355-7/9)

Location	Circuit Block	Type	Remarks
Scanner Unit	Motor with gear	7BDRD0044A*	DC brushless (ordinary speed)
Scanner Unit	Motor with gear	7BDRD0045A*	DC brushless (high speed)
Scanner Unit	Modulator	NMA-550	CPA-264 included CMB-404 included Excluding Magnetron
Scanner Unit	Receiver	NRG-162A	CMA-866A included
Scanner Unit	Modulation circuit	CPA-264	
Scanner Unit	Power supply circuit	CBD-1682A	
Scanner Unit	T/R control circuit	CMC-1205R	
Scanner Unit	Motor control circuit	CBD-1779	
Scanner Unit	Heater control circuit	CHG-216	Optional (100 VAC)
Scanner Unit	Encoder	CHT71A	
Scanner Unit	Fan	7BFRD0002*	

"*" means revision, such as A, B and so on.

Table 3.1-19 NCD-2182

Location	Circuit Block	Type	Remarks
Display Unit	Processing circuit	CDC-1346BR	
Display Unit	I/F circuit	CMH-2235	
Display Unit	I/F circuit	CQC-1262	
Display Unit	Operation circuit	CCK-991	
Display Unit	Operation circuit	CCK-1017	
Display Unit	Fuse	MF60NR 250V 10	F1

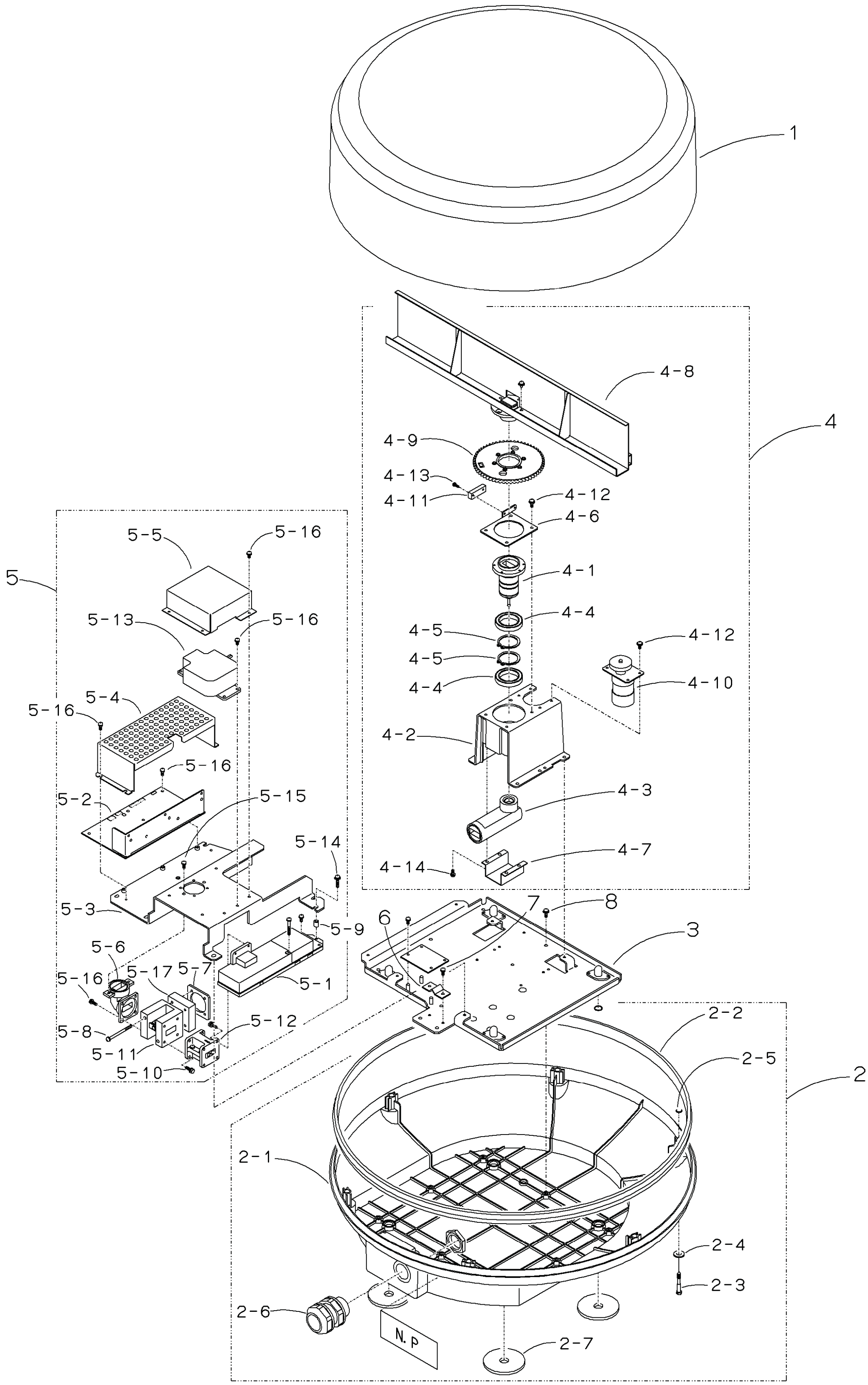
3.2 Exploded Diagrams

3.2.1 NKE-2042

No.	Name	Product code	Service code	Notes
1	Upper Radome Assy.	MPBC36726	MPBC36726	
2	Lower Radome Assy.	MPBX39791	MPBX39791	
2-1	Lower Radome	MPBC36068A		
2-2	Packing	MTT307991		
2-3	Bolt	MPTG31164		
2-4	Seal Washer	BRTG03190		
2-5	O-Ring	BRPK00019		
2-6	Cable Clamp	BRJD05037		
2-7	Spacer	MTT307999		
3	Chassis Assy.	MPBX39946		
4	Main Shaft Assy.	MPGK30870A		
4-1	Rotary Joint	MPAB02055		
4-2	Housing	MTC301103		
4-3	Connecting Wave Guide	MPAB31163		
4-4	Bearing	BRGK05421		6006ZZCM/1K
4-5	C-Ring	BRTG00735		
4-6	Push Plate	MTB361576		
4-7	Push Plate	MTB361502		
4-8	Antenna Assy.	MPAE30095A	MPAE30095A	
4-9	Spur Gear	MPGK02946		
4-10	Motor Assy.	7BDRD00023	7BDRD00023	
4-11	Reed Switch	5MPAB00001		
4-12	NB4X10BS	BSNB04010B		
4-13	NC3X12BS	BSNC03012B		
4-14	NC4X8BS	BSNC04008B		

No.	Name	Product code	Service code	Notes
5	Transceiver Assy.	MDNZT5011A		NZT-12
5-1	Receiver Assy.	MDNRG5061	NRG-225	
5-2	Modulator Assy.	MDMW10830	CME-322	
5-3	Mounting Plate	MPBX39034		
5-4	Modulator Assy. Cover	MTB360476A		
5-5	Magnetron Cover	MTB360477B		
5-6	Corner Wave Guide	MTM003700		
5-7	Guide Plate	MTB358269		
5-8	Screw	BRTG07161		
5-9	Spacer	BRBP05094		
5-10	Upset Bolt	BRTG06852		
5-11	Circulator	5AJAA00004		FCX68
5-12	Diode Limiter	5EZAA00024		NJS6930
5-13	Magnetron	5VMAA00049	5VMAA00049	MSF1421B
5-14	NB4X20BS	BSNB04020B		
5-15	NA4X10BS	BSNA04010B		
5-16	NC4X10BS	BSNC04010B		
5-17	Filter	MPAB31167		
6	Push Plate	MTB319525		
7	NC4X10BS	BSNC04010B		
8	NB4X10BS	BSNB04010B		

Figure 3.2-1 Exploded Diagram of NKE-2042



3.2.2 NKE-2043

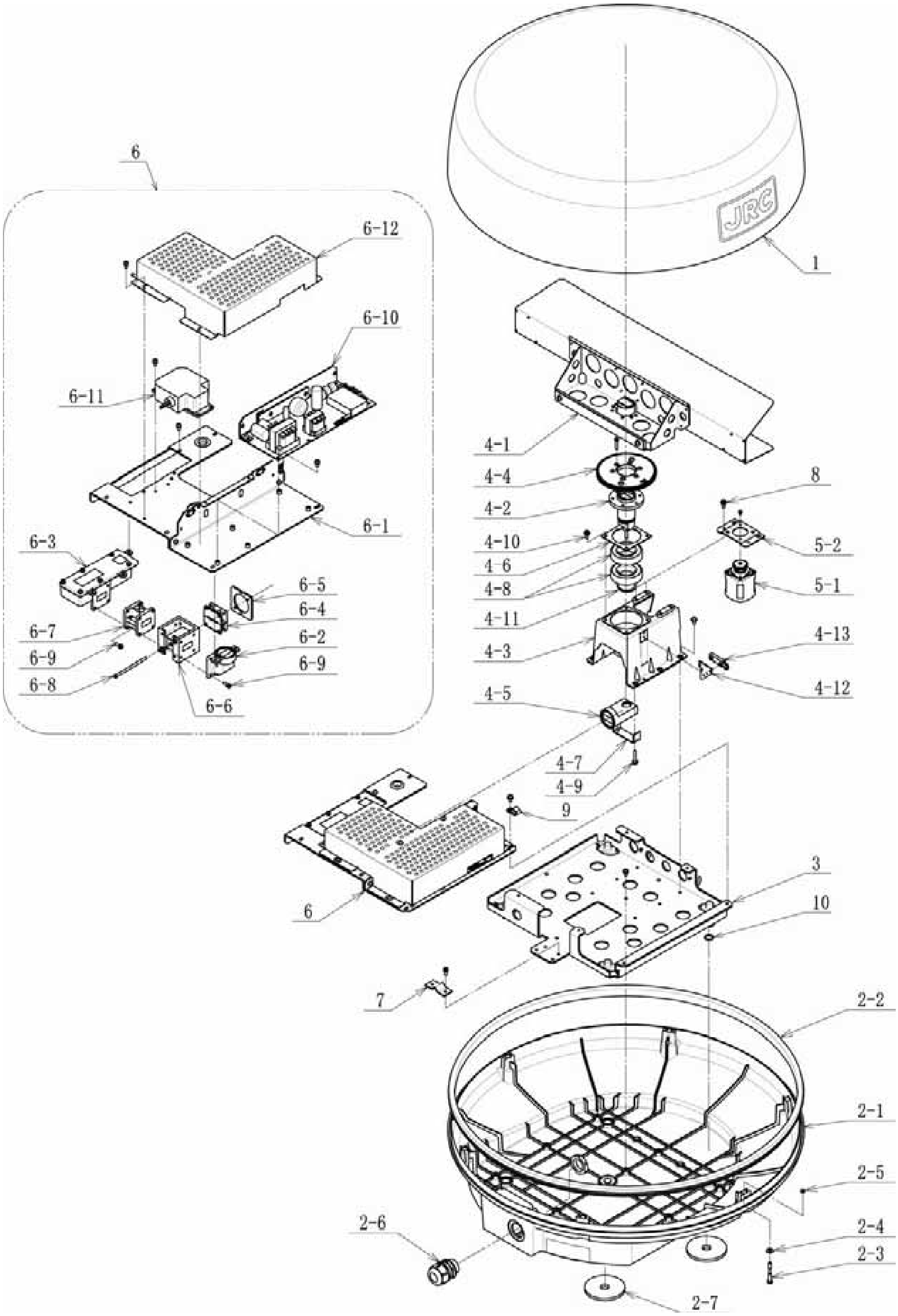
NO.	PART NAME	PRODUCT CODE	SERVICE CODE	NOTE
1	Upper Radome Assy.	MPBC36726A		
2	Lower Radome Assy.	MPBX46698		
2-1	Lower Radome	MPBC36068B		
2-2	Packing	MTT307991		
2-3	Bolt	MPTG31164		HEX5X40
2-4	Seal Washer	BRTG03190		SUS W-5
2-5	O-Ring	BRPK00019		P4 ID3.8 d1.9
2-6	Cable Gland	BRJD05113		
2-7	Spacer	MTT307999		
3	Base Plate Assy.	MPBX46699		
4	Antenna Drive Assy.	MPGK31386		
4-1	Antenna Assy.	MPAE30564		
4-2	RJ Shaft Assy.	MPAB32149		
4-3	Housing	MTC301909		
4-4	Gear Assy.	MPGK02946		
4-5	Waveguide	MTM302099		
4-6	Bearing Push Plate	MTB400407		
4-7	Push Plate	MTB399834		
4-8	Bearing	BRGK05421		6006ZZCM/1K
4-9	Bolt	BRTG08900		M4X25 SW W
4-10	Bolt	BRTG06852		M4X12 SW W
4-11	C-Ring	BSSC30000S		SC30SK5M/T1.5
4-12	Proximity Switch Bracket	MTB399803		
4-13	Proximity Switch	-		NRS-102-70F
5	Motor Assy.	MPEM30230		
5-1	Motor	7BDRD0052A	7BDRD0052A	
5-2	Motor Bracket	MTB400408		

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NO.	PART NAME	PRODUCT CODE	SERVICE CODE	NOTE
6	Transceiver Assy.	MDNZT5030	NZT2043	
6-1	Main Chassis	MPBX46700		
6-2	Corner Waveguide	MTM302115		
6-3	Receiver Unit	MDNRG5108	NRG239	
6-4	Filter	MPAB32161		
6-5	Guide Plate	MTB400460		
6-6	Circulator	5AJIX00027	5AJIX00027	FCR68R
6-7	Diode Limiter	5ATBT00006	5ATBT00006	NJS6930
6-8	Cross-recessed Head Screw	BRTG09936		M4X75FE
6-9	Bolt	BRTG09167		M4X12 SW
6-10	Compound Modulator Circuit Unit	MDMW11168	CME385	
6-11	Magnetron	5VMAA00092	5VMAA00092	MSF1421B
6-12	Cover	MTB400411		
7	Push Plate	MTB319525		
8	Bolt	BRTG06852		M4X12 SW W
9	Cable Clamp	BRBP05605		FGC-8-M4
10	O-Ring	BRPK05256		P12 ID=11.8 D=2.4

Figure 3.2-2 Exploded Diagram of NKE-2043

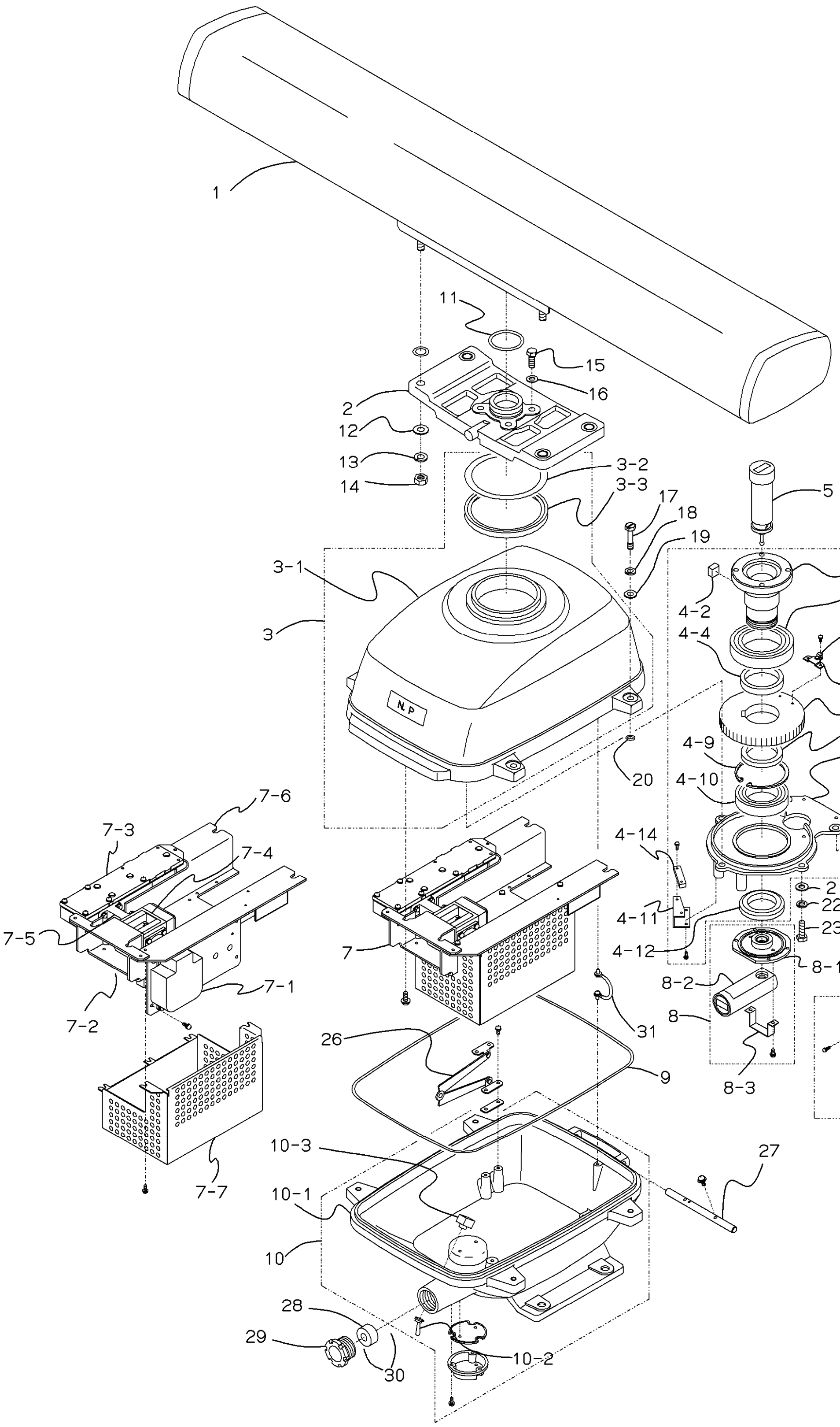


3.2.3 NKE-2062

No.	Name	Product code	Service code	Notes
1	Radiator Assy.	MPAE30324	NAX-43-4	NAX-43-4
2	Antenna Support Assy.	MPGK30781		
3	Upper Housing Assy.	MPBX38807A		
3-1	Upper Housing	MTC301686A		
3-2	Wave Prevention Ring	MTT307768		
3-3	V-Ring	BRPK00189		
4	Drive Assy.	MPGK30751		
4-1	Main Shaft	MTC300209B		
4-2	Key	MTL310809		
4-3	Bearing	BRGK05420		6011ZZ
4-4	Spacer	MTL303193		
4-5	Spur Gear	MTG300325A		
4-6	Magnet Support	MPBC33954		
4-7	Spacer	MTL303194		
4-8	Bracket	MTC300358B		
4-9	Retaining Ring Type-C	BRTG05289		
4-10	Bearing	BRGK05409		6009ZZ
4-11	Mounting Plate	MTB383221		
4-12	Bearing Nut	BRTG06929		AN09
4-13	Magnet	5MPAB00001		
4-14	Reed Switch	5KRAA00058		
5	Rotary Joint Assy.	MPAB30186		
6	Motor Assy.	MPGK30750	CBP-153	CBP-153
6-1	Motor	H-7BDRD0041		
6-2	Brush	-	BRXP05247	
7	Transceiver Assy.	MDNZT5028		NZT-2062
7-1	Magnetron	5VMAA00049	5VMAA00049	MSF1421B
7-2	Modulator Assy.	MDMW10829	CME-323	CME-323
7-3	Receiver Assy.	MDNRG5060	NRG-226	NRG-226
7-4	Circulator	5AJAA00004		FCX68
7-5	Diode Limiter	5EZAA00024		NJS6930
7-6	Chassis Assy.	MPBX38805		
7-7	Cover	MPBC36158		

No.	Name	Product code	Service code	Notes
8	Connecting Wave Guide	MPAB31161		
8-1	Choke Flange	MTM300624B		
8-2	Connecting Wave Guide	MTM301492A		
8-3	Push Plate	MTB361809		
9	Packing	MTT305919A		
10	Lower Housing Assy.	MPBX38806A		
10-1	Lower Housing	MTC301687		
10-2	Switch Cover	MPPK00925A		
10-3	Switch	5SAAJ00029		
12	Washer	MTL315466		
13	Spring Washer	BRTG00404		
14	Hexagonal Nut	BRTG05643		
15	Coated Bolt	BRTG06849		
16	Seal Washer	BRTG06850		
17	Screw	MTL006545A		
18	Spring Washer	BRTG00747		
19	Washer	BRTG00224		
20	O-Ring	BRPK00027		
21	Hexagonal Bolt	BRTG06851		
22				
23				
24	Spring Washer	BSSW06000S		
25	Hexagonal Bolt	BRTG05418		
26	Stay	MPDM00675A		
27	Shaft	MTL314603		
28	Gasket	MTT308695		
29	Clamp Gland	MPTG30399		
30	Washer	BRTG00883		
31	Ground Cable	MPKC06160		

Figure 3.2-3 Exploded Diagram of NKE-2062



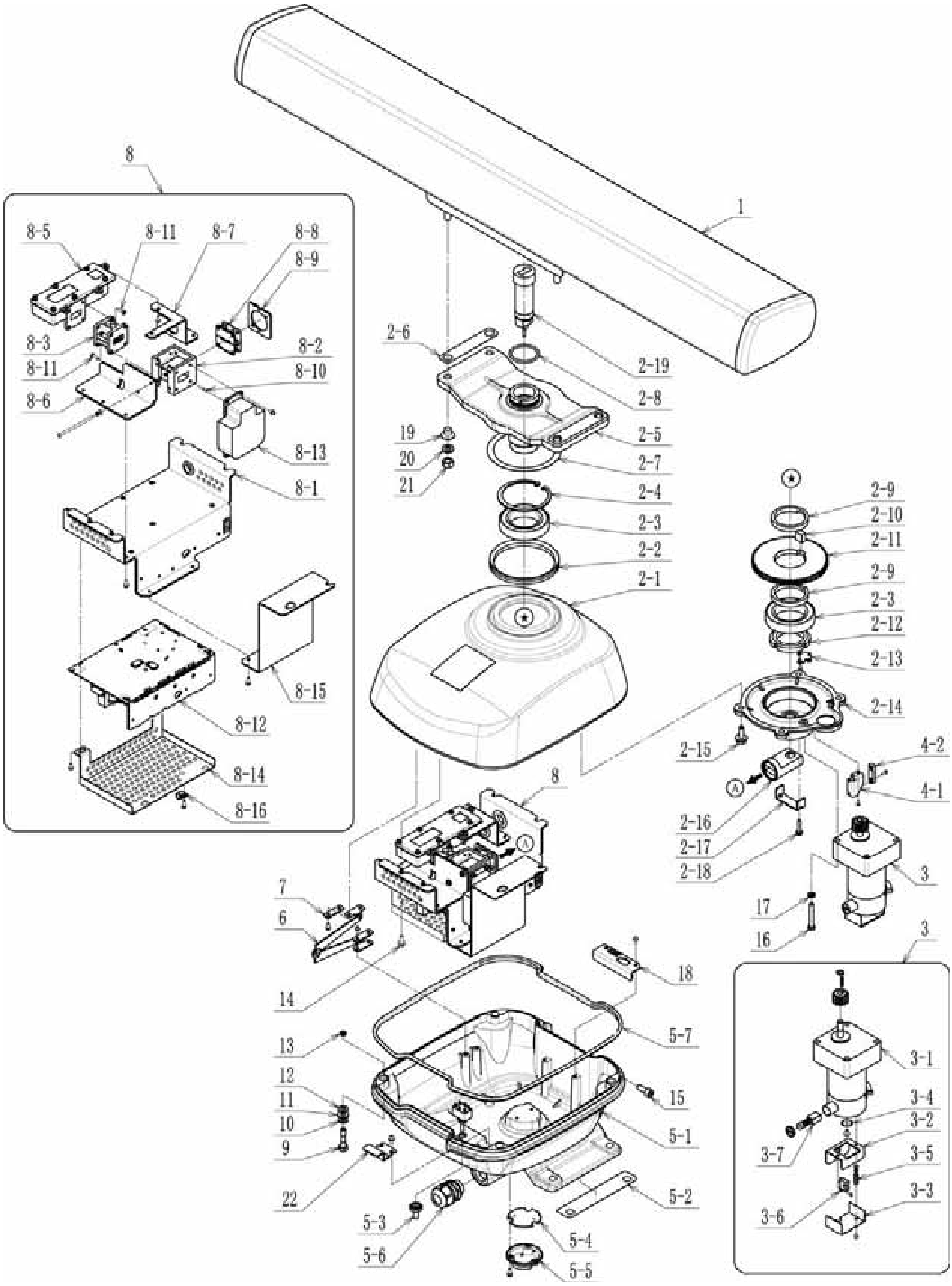
3.2.4 NKE-2063

NO.	PART NAME	PRODUCT CODE	SERVICE CODE	NOTE
1	Radiator Assy.	MPAE30324A	NAX-43-4Y	NAX-43-4Y
2	Drive Assy.	MPGK31394		
2-1	Upper Housing	MTC301913		
2-2	V-Ring	BRPK00189		
2-3	Bearing	BRGK05625		6010ZZCM/5K
2-4	Retaining Ring Type-C	BRTG09940		
2-5	Antenna Support	MTC301915		
2-6	Seat	MTT314164		
2-7	Slide Plate	MTT308077		
2-8	O-Ring	BRPK00054		P42
2-9	Spacer	MTL329303		
2-10	Key	MTL329304		
2-11	Gear	MTG300541		
2-12	Bearing Nut	BRTG06929		
2-13	Magnet Assy.	MPBC45971		
2-14	Bracket	MTC301916		
2-15	Bolt	BRTG09297		M8X25 SW W
2-16	Waveguide	MTM302099		
2-17	Push Plate	MTB399834		
2-18	Bolt	BRTG08900		M4X25 SW W
2-19	Rotary Joint	MPAB32153		
3	Motor Assy.	MDBW10896	CBP218	CBP-218
3-1	Motor	7BDRD0041A	7BDRD0041A	
3-2	Chassis	MTB399835		
3-3	Cover	MTB399836		
3-4	Slit Plate	MTB124251		
3-5	Spacer	BRBP06320		BSB-318E
3-6	Photointerrupter	-		OJ-431-30
3-7	Brush	BRXP05247		54531-01
4	Proximity Switch Assy.	MPSW30190		
4-1	Proximity Switch Bracket	MTB399837		
4-2	Proximity Switch	-		NRS-102-70F

NO.	PART NAME	PRODUCT CODE	SERVICE CODE	NOTE
5	Lower Housing Assy.	MPBX46703		
5-1	Lower Housing	MTC301914		
5-2	Seat	MTT314165		
5-3	Switch Cover	MPPK00925A		
5-4	Packing	MTT305919A		
5-5	Breathing Cap	MTV302550		
5-6	Cable Gland	BRJD05113		FGA26-16B
5-7	Packing	MTV304950		
6	Stay	MPDM00675A		
7	Push Plate	MTB399907		
8	Transceiver Assy.	MDNZT5031	NZT2063	
8-1	Main Chassis	MPBC45972		
8-2	Circulator	5AJIX00027	5AJIX00027	FCX68R
8-3	Diord Limiter	5ATBT00006	5ATBT00006	NJS6930
8-4	-	-		
8-5	Receiver Unit	MDNRG5108	NRG239	
8-6	CIR-Bracket1	MTB400635		
8-7	CIR-Bracket2	MTB400636		
8-8	Filter	MPAB32161		
8-9	Guide Plate	MTB400460		
8-10	MG-PIN	MTL325492		
8-11	Bolt	BRTG09167		M4X12 SW
8-12	Compound Modulator Circuit Unit	MDMW11169A	CME386	
8-13	Magnetron	5VMAA00090	5VMAA00090	MSF1422B
8-14	Cover Assy.	MPBC46094		
8-15	Support Plate	MTB400681		
8-16	Cable Clamp	BRBP05605		
9	Bolt	MPTG32219		
10	Spring Washer	BRTG00747		M8
11	Washer	BRTG00224		M8
12	Sealing Washer	BRTG06850		SUSW8S1
13	O-Ring	BRPK00027		P7
14	Bolt	BRTG09004		M5X16 SW W
15	Cap Screw	BRTG09939		M8X25AL
16	Bolt	BRTG09937		M6X45
17	Spring Washer	BSSW06000S		M6
18	Connector Assy.	MPBC46111		
19	Brass Washer	MTL325583		

NO.	PART NAME	PRODUCT CODE	SERVICE CODE	NOTE
20	Spring Washer	BRTG00404		M10
21	Nut	BRTG05643		M10
22	Push Plate	MTB400735		

Figure 3.2-4 Exploded Diagram of NKE-2063



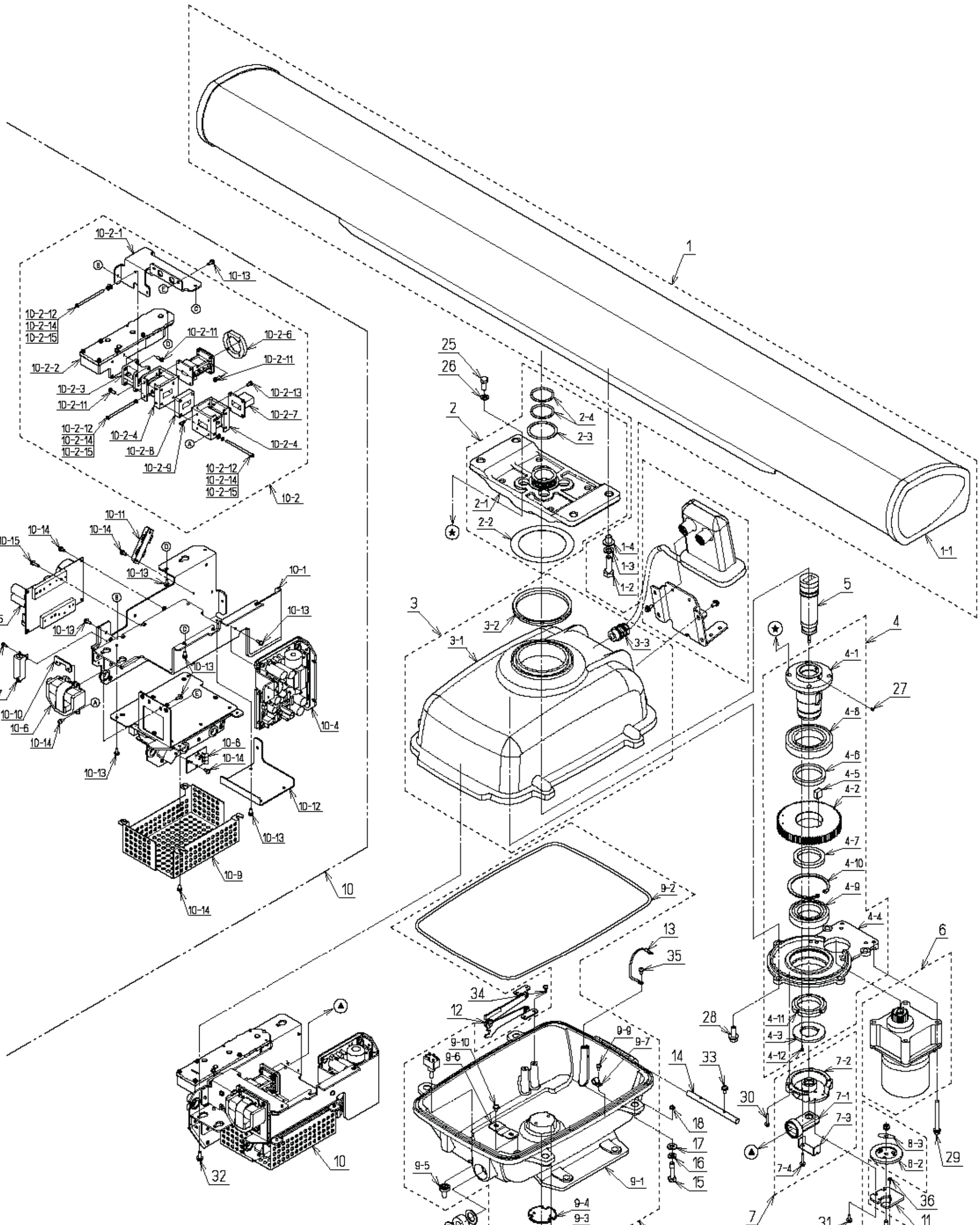
3.2.5 NKE-2103

No.	Name	Product code	Service code	Notes
1	Radiator Assy.	MDNAX5041	NAX-16B-6	NAX-16B-6
1-1	Radiator Assy.	MDNAX5041		
1-2	Hexagonal Bolt	BRTG07249		M10X35SUS S Coat
1-3	Spring Washer	BRTG00404		SW10 SUS
1-4	Washer	MTL315466		
2	Antenna Support Assy.	MPGK31182		
2-1	Antenna Support	MTC301684		
2-2	Slide Plate	MTT309252		
2-3	Waterproof Ring	MTT309256A		
2-4	O-Ring	BRPK00054		P42
3	Upper Housing Assy.	MPBX44085		
3-1	Upper Housing	MTC301682		
3-2	V-Ring	BRPK00189		V-100A
3-3	Cable Clamp	BRBP06738		OA-W1611EC1-BB
4	Main Shaft Assy.	MPGK31181		
4-1	Main Shaft	MTC301685		
4-2	Spur Gear	MTG300511		Large
4-3	Spur Gear	MTG300424A		Small
4-4	Bracket	MTC301655		
4-5	Key	MTL325003		
4-6	Spacer 1	MTL325004		
4-7	Spacer 2	MTL325005		
4-8	Bearing	BRGK05420		6011ZZ
4-9	Bearing	BRGK05409		6009ZZ
4-10	Retaining Ring Type-C	BRTG05289		HC75 SK5
4-11	Bearing Nut	BRTG06929		AN09
4-12	C Sems Screw	BSNC03010B		NC3X8Bs
5	Rotary Joint Assy.	MPAB31563		
6	DC Motor with Reduction Gear	H-7BDRD00048	7BDRD00048	CBP-202
7	Connecting Wave Guide Assy.	MPAB31564		
7-1	Connecting Wave Guide	MTM301722A		
7-2	Choke Flange	MTM301843		
7-3	Connecting Guide Push Plate	MTB366792A		
7-4	Hexagonal Bolt	BRTG08900		Upset with M4X25 SUS SW W

No.	Name	Product code	Service code	Notes
8	Encoder Assy.	MPEM30205		
8-1	BP Generation Circuit	MDMW11070	CHT-71A	CHT-71A
8-2	Spur Gear	MTT006909B		
8-3	Turn-Stopper	MTD001842		
9	Lower Housing Assy.	MPBX44086A		
9-1	Lower Housing	MTC301683		
9-2	Packing	MTT312329		
9-3	Breathing Cap	MTV302550		
9-4	Packing	MTT305919A		
9-5	Switch Cover	MPPK00925A		
9-6	Cable Push Plate	MTB366112		
9-7	Nylon Clamp	BRBP00009		
9-8	Screw	BSNK04010B		NK4X10Bs
9-9	V Sems Screw	BSNC04010B		NC4X10Bs
9-10	B Sems Screw	BSNB05010B		NB5X10Bs
10	Tranceiver Assy.	MDNZT5023		NZT-2103
10-1	Main Chassis	MPBX44420		
10-2	Wave Guide Circuit	MPAB31606		
10-2-1	CIR-Attachment	MTB389799		
10-2-2	Receiver Unit	MDNRG5093	NRG-610	NRG-610
10-2-3	Diode Limiter	5ATBT00006		NJS6930
10-2-4	Circulator	5AJIX00027		FCX68R
10-2-5	Filter	5AWAX00002		NJC-9952
10-2-6	Guide Plate	MTL326122		
10-2-7	Dummy Load	5ANDF00001		NJC4002
10-2-8	Spacer	MTL318403		
10-2-9	MG-PIN	MTL325492		
10-2-10	-			
10-2-11	Hexagonal Bolt	BRTG07397		Upset with M4X12 SW SUS304
10-2-12	Screw	BRTG07156		M4X70 Bs
10-2-13	C Sems Screw	BSNC04010B		NC4X10Bs
10-2-14	Spring Washer	BSSW04000S		SW4
10-2-15	Washer	BSFW04000B		W4Bs
10-3	Modulator Assy.	MPBX44290	CME-363	CME-363
10-4	Power Supply Assy.	MPBX44291	CBD-1783	CBD-1783
10-5	Motor Control Power Circuit	MDBW10832	CBD-1779	CBD-1779
10-6	Magnetron	5VMAA00102	5VMAA00102	MAF1565N
10-7	Brake Resistor	-		CFA-252
10-8	Filter Circuit	-		CFR-234
10-9	Cover	MTB389805		
10-10	Nut Plate	MTB388518		
10-11	Connection Plate	MTB388903		

No.	Name	Product code	Service code	Notes
10-12	Motor Cover	MTB391765		
10-13	B Sems Screw	BSNB04012B		NB4X12Bs
10-14	C Sems Screw	BSNC04010B		NC4X10Bs
10-15	C Sems Screw	BSNC04016B		NC4X16Bs
10-16	C Sems Screw	BSNC03008B		NC3X8Bs
11	Encoder Plate	MTB388510A		
12	Stay	MPDM30321		
13	Ground Cable	H-7ZCRD1504		
14	Shaft	MTL325006		
15	Screw	MTL006545A		M8X35 Machining
16	Spring Washer	BRTG00747		SW8 SUS
17	Washer	BRTG00224		W8
18	O-Ring	BRPK00027		P7
19	Clamp Gland	MPTG30399		
20	Cover	BRTG01414		
21	Gasket	MTT308695A		
22	Washer	BRTG00883		
23	-			
24	-			
25	Coated Hexagonal Bolt	BRTG09192		M8X20 SUS304 coated
26	Seal Washer	BRTG06850		SUSW8S1
27	Hex-Head Setscrew	BRTG1030G		M4X0.7X6 SUS304
28	Hexagonal Bolt	BRTG09297		M8X25 FE SW W ZMC4RBU
29	Upset Bolt	BRTG09296		M6X70 FE SW W ZMC4RBU
30	C Sems Screw	BSNC04025B		NC4X25Bs
31	Upset Bolt	BRTG06852		M4X12 SW W SUS304
32	Upset Bolt	BRTG09004		M5X16 SW W SUS304
33	B Sems Screw	BSNB05010B		NB5X10Bs
34	B Sems Screw	BSNB04012B		NB4X12Bs
35	C Sems Screw	BSNC04010B		NC4X10Bs
36	C Sems Screw	BSNC03008B		NC3X8Bs

Figure 3.2-5 Exploded Diagram of NKE-2103



3.2.6 NKE-2254

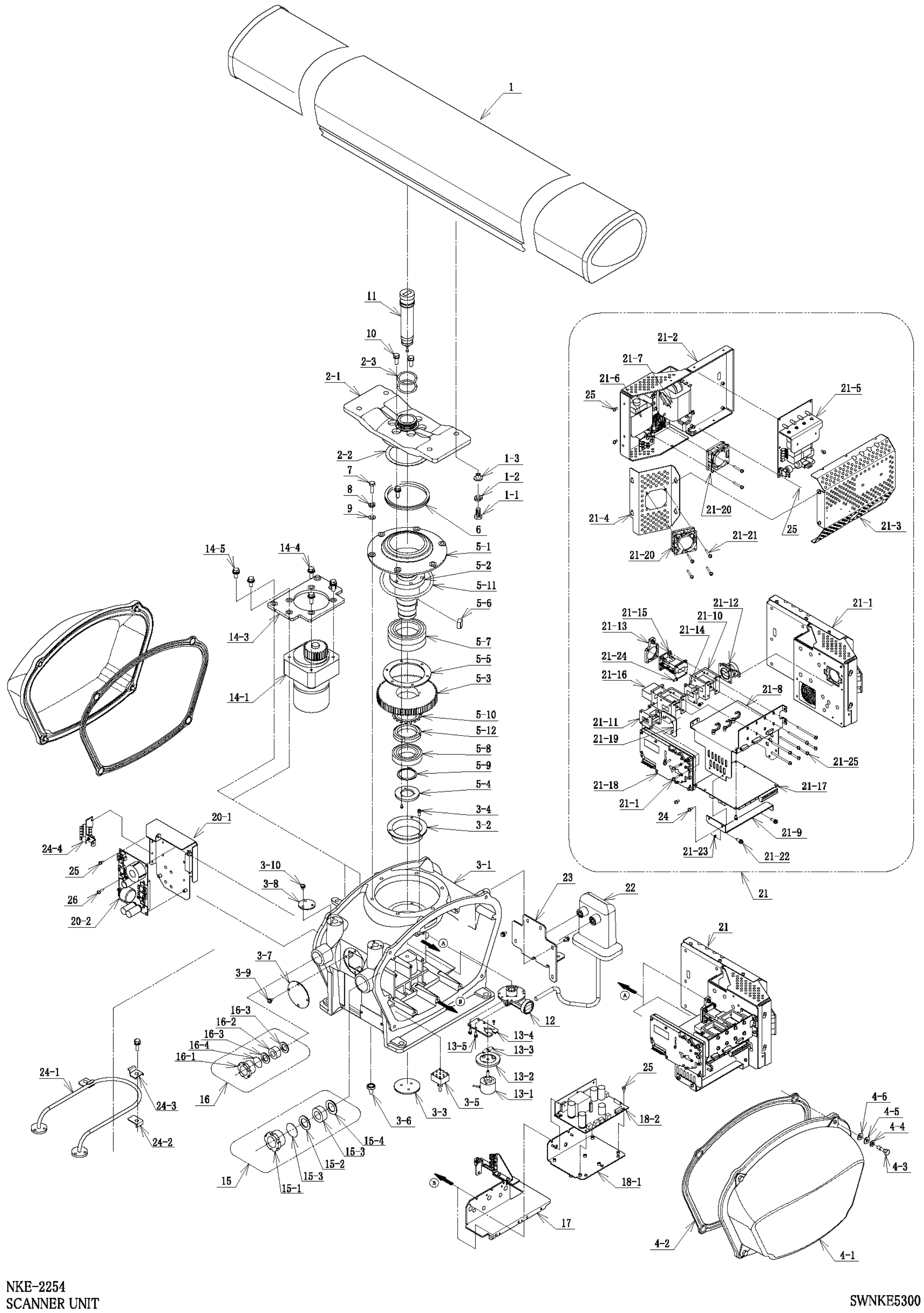
No.	Name	Product code	Service code	Notes
1	Radiator Assy.		NAX-16B	274.32 cm/213.36 cm/182.88 cm
1-1	Hexagonal Bolt	BRTG07249		HEX10X35 SUS304
1-2	Spring Washer	BRTG00404		SW10
1-3	Washer	MTL315466		
2	Antenna Support Assy.	MPBX40223		
2-1	Antenna Support	MTC301223A		
2-2	Slide Plate	MTT309252		
2-3	O-Ring	BRPK00054		P42 ID41.7 D3.5 Type 1A
3	Housing Assy.			
3-1	Housing	MTC301727		
3-2	Bearing Sleeve	MTL317432		
3-3	Breathing Cap	MTT309253		
3-4	Upset Bolt	BRTG09305		M5X12 FF ZMC4RBU
3-5	Safety SW	MDLW11931		CSD-654
3-6	Switch Cover	MPPK00925A		
3-7	Cover (large)	MTB389969		
3-8	Cover (small)	MTB389970		
3-9	NK5X10Bs	BSNK05010B		
3-10	NK5X12Bs	BSNK05012B		
4	Cover Assy.	MPBX44875		
4-1	Cover	MTC301729		
4-2	Cover Packing	MTV303883		
4-3	Hexagonal Bolt	MPTG31381		
4-5	Spring Washer	BRTG00747		M8SUS3042 3.2X2
4-4	Washer	BRTG00224		M8SUS304 round polished type 1
4-6	Seal Washer	BRTG01826		M8 SUS

No.	Name	Product code	Service code	Notes
5	Main Shaft Assy.	MPGK30895C		
5-1	Flange	MTC301224A		
5-2	Main Shaft	MTH300568A		
5-3	Spur Gear	MTG300423A		
5-4	Spur Gear	MTG300424		
5-5	Bearing Push Plate	MTB366794A		
5-6	Key	MTL317433		
5-7	Radial Ball Bearing	BRGK05410		6012ZZ CM/5K
5-8	Radial Ball Bearing	BRGK05409		6009ZZ CM/5K
5-9	C-Ring	BRTG06164		
5-10	Bearing Washer	BRTG07261		AW10X ID50
5-11	O-Ring	BRPK05043		G155 Type 1 A
5-12	AN10	BSAN10000S		AN10 M50X1.5
6	V-Ring	BRPK00189		V-100A
7	Hexagonal Bolt	BRTG07268		M8X25 TI
8	Spring Washer	BRTG07270		M8 TI
9	Washer	BRTG07267		M8 TI
10	Coated Hexagonal Bolt	BRTG06849		M8X23 Coated 2471L=15 SUS304
11	Rotary Joint Assy.	MPAB31188		
12	Connecting Wave Guide Assy.	MPAB31207A		
13	Encoder Assy.	MPEM30202		
13-1	BP Generation Circuit	MDMW11068	CHT-71A	CHT-71A
13-2	Spur Gear	MTT006909B		
13-3	Turn-Stopper	MTD001842		
13-4	Encoder Plate	MTB366793A		
13-5	Upset Bolt	BRTG06852		M4X12 SW W SUS304
14	Motor Assy.	-		
14-1	Motor	MPEM30204	MPEM30204	CBP-168A
14-2	-	-		
14-3	Motor Flange	MTC301225		
14-4	Hexagonal Bolt	BRTG09307		M8X30 SW W SUS304
14-5	Hexagonal Bolt	BRTG09306		M8X20 SW W FE ZMC
15	Gland (A30)	MPJD30062A		
15-1	Clamp Gland	MPTG31572A		
15-2	Gasket	BRPK00108		
15-3	Washer	BRTG01246		30B AL
15-4	Cover	BRTG01415		30 AL

No.	Name	Product code	Service code	Notes
16	Gland (A25)	MPJD30063A		
16-1	Clamp Gland	MPTG31573A		
16-2	Gasket	BRPK00134		A25a
16-3	Washer	BRTG00883		25A AL
16-4	Cover	BRTG01414		25 AL
17	Heat Radiation Board Assy.	MPBC43035		
18	Power Supply Unit	MPBX44439		
18-1	Chassis Assy. (PS)	MPBX44440		
18-2	Power Supply Circuit	MDBW10837		CBD-1682A
19	-	-		
20	Motor Control Assy.	MPBX44318A		
20-1	Motor Control Chassis Assy.	MPBX44319		
20-2	Motor Control Power Circuit	MDBW10832		CBD-1779
21	Tranceiver Assy.	MDNZT5024A		NZT-1125
21-1	Modulator Assy.	MDNMA5077A		NMA-550
21-2	Main Chassis Assy.	MPBX44445		
21-3	Cover Assy. (L)	MPBX44446		
21-4	Cover Assy. (S)	MPBX44447		
21-5	Modulation Circuit	MDLW11930	CPA-264 (MDLW11927)	CPA-264
21-6	Magnetron	-	5VMAA00106	
21-7	Pulse Transformer	-		
21-8	Flame	MPBC43040		
21-9	Holding Plate	MTB389330		
21-10	Circulator	-		
21-11	Diode Limiter	-		
21-12	Connecting Wave Guide	MPAB31622		
21-13	Guide Plate	MTC301794		
21-14	Spacer	MTL318403		
21-15	Spurious Filter	-		NJC9952
21-16	Dummy Load Assy.	-		NJC4002
21-17	TR CONT PC plate	-	CMC-1205R	CMC-1205R
21-18	Receiver	MDNRG5094A	NRG-162A	NRG-162A
21-19	Nut Plate	MTB389894		
21-20	Fan	MPEM30151		
21-21	NC4X30Bs	BSNC04030B		
21-22	Hexagonal Bolt	BRTG07502		Upset with M5X16 SW W SUS304
21-23	O-Ring	BRPK00019		

No.	Name	Product code	Service code	Notes
21-24	Hexagonal Bolt	BRTG07397		Upset with M4X12 SW SUS304
21-25	Screw	BRTG05659		NK4X0.7X65Bs
22	Performance Monitor	-	NJU-85	NJU-85
23	Performance Monitor Adapter	MPBC43041A		
24	Heater kit	MDMW11067A		(CHG-216P)
24-1	Heater	-		
24-2	Plate Clamp 1	MTB374149		
24-3	Plate Clamp 2	MTB374150		
24-4	Heater Terminal Board Assy.	MPTE30386		
25	NC4X10Bs	BSNC04010B		
26	NC4X16Bs	BSNC04016B		

Figure 3.2-6 Exploded Diagram of NKE-2254

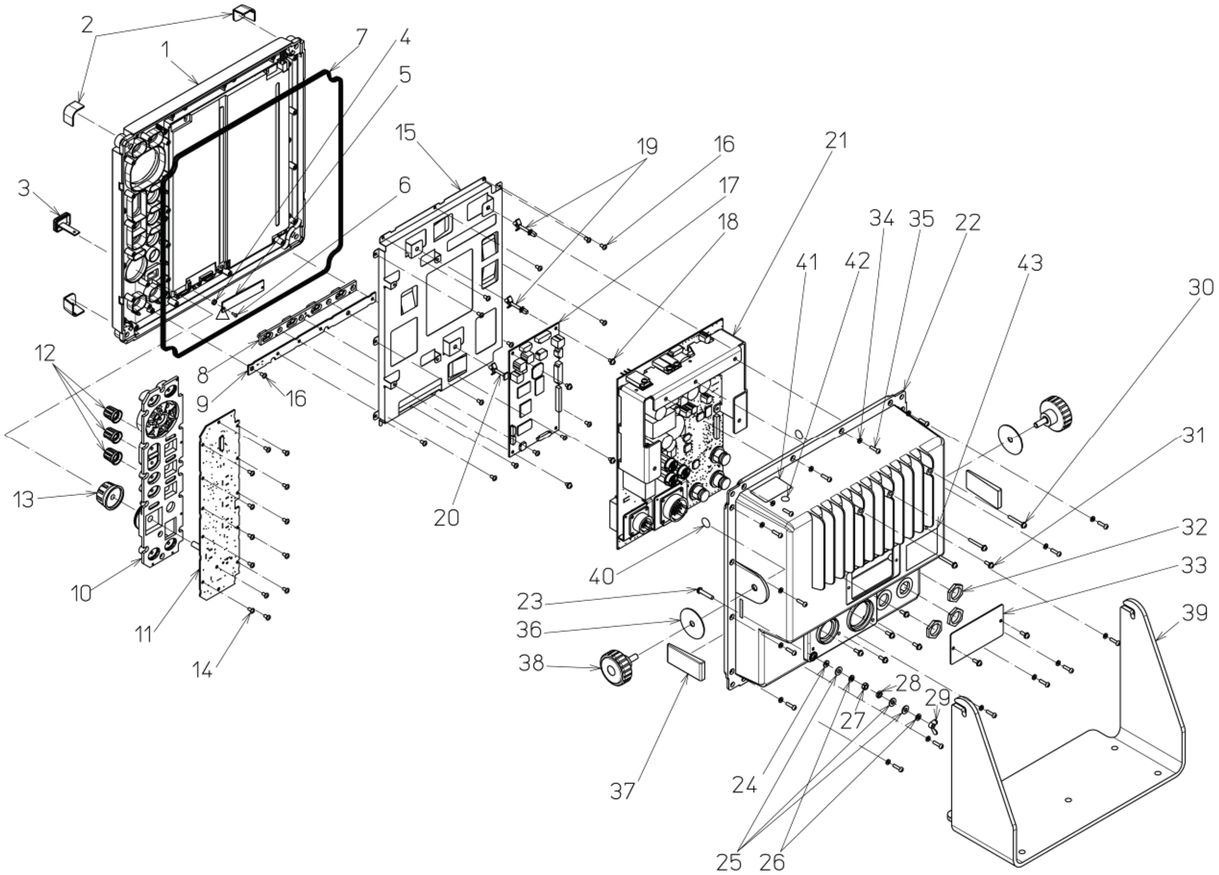


3.2.7 NCD-2182

No.	Name	Code	Notes
1	LCD	MPXP34814	
2	Cover	MTV302382	
3	USB Cover	MTT313751	
4	Spacer	BRBP05062	
5	I/F circuit	CQC-1262	
6	Tapping screws	BRTG09751	
7	Bezel Packing	MTV304868	
8	Soft key	MTV304865A	
9	Operation Circuit	CCK-1017	
10	Main Operation Rubber	MTV304885	
11	Operation Circuit	CCK-991	
12	ϕ16 Knob	MPHD30383	
13	ϕ30 Knob	MPHD30380	
14	PT Screw	BRTG09223	
15	LCD Push Plate	MTB397474A	
16	PT Screw	BRTG09224	
17	Processing Circuit	CDC-1346BR	
18	Embedded Screw	BSNC03006B	
19	Locking Card Spacer	BRBP00564	
20	Locking Card Spacer	BRBP07253	
21	I/F Circuit CMH-2235	MDYW12732	
22	Rear Cover	MTC301867	
23	Screw	BSNK04025B	
24	Rubber Washer	MTT311607	
25	Washer	BSFW04000B	
26	Spring Washer	BSSW04000S	
27	Hexagonal Nut	BSHN04000W	
28	Lock Nut	BSLN04000W	
29	Butterfly Nut	BSBN04000B	
30	Embedded Screw	BRTG03553	
31	Embedded Screw	BRTG03547	
32	Connector Nut	—	
33	Rear Cover	MTB397333	
34	Rubber Washer	MTT304158A	
35	Tap-tight Binding screw	BRTG06198	
36	Rubber Spacer	MTT313905	
37	Rubber cushion	MTV304883	

No.	Name	Code	Notes
38	Knob Bolt	BRTG09876	
39	Stand 3300	MTB397951	
40	Screw Cover	MPNN46906	
41	PL Nameplate	MPNN34331A	
42	Environment label (10) Small	MPNN44289	
43	Nameplate	MPNN46847	

Figure 3.2-7 Exploded Diagram of NCD-2182



Chapter 4
Replacement of Major Parts

4.1 Precautions for replacing parts in the scanner unit

Follow the precautions below to carry out parts replacement without getting injured.

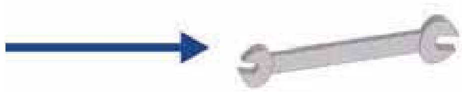
Note:

- Confirm that all the radar equipment (if more than one unit is used) is turned off before you start the parts replacement. For the sake of safety, turn off the main power circuit breaker.
- Wear gloves to protect your hands during parts replacement. Be very careful not to drop a tool or part when you work in high places.
- Carry out parts replacement while the ship does not roll or pitch much in a bay if possible.
- Be careful that the radiator does not hit anyone during parts replacement. The radiator can turn with wind or the like.

4.2 Parts Replacement for the Scanner Unit NKE-2042 (JMA-3314)

[Required tools]

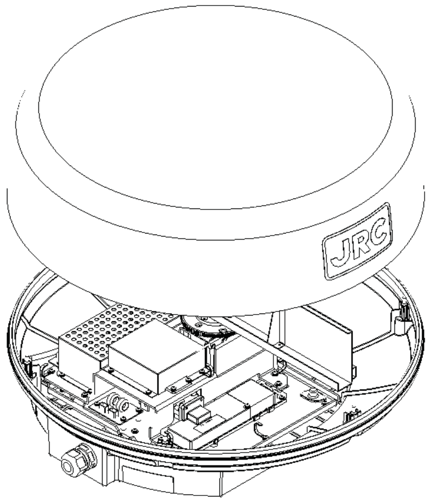
- Tools for removing the cover from the scanner unit
  A wrench (width across flats 8 mm for M5 bolts)

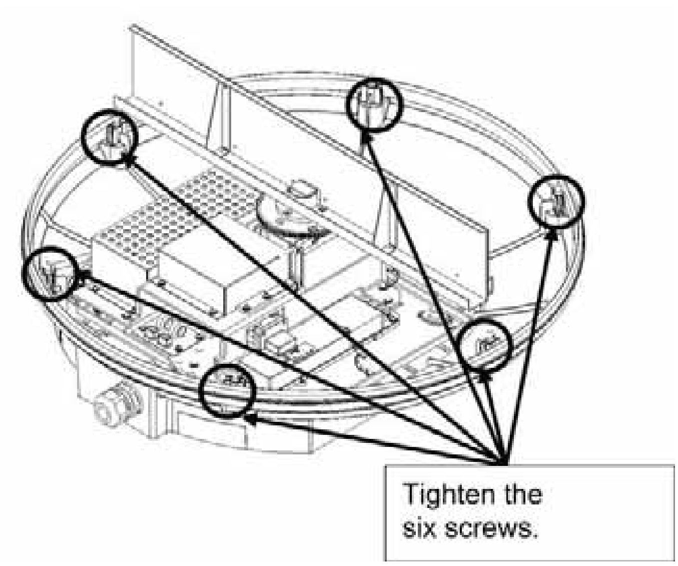


- Tools used in each part replacement procedure

[Replacement procedure]

1 Loosen the six hexagon bolts, and then remove the radome.





2 Replace the parts, which need replacement, according to the procedures in the subsequent sections.

Be careful not to lose screws or brackets removed during replacement.

3 After replacing the parts, align the triangle mark (□) and close the radome.
(Be sure to attach the cap when replacing the magnetron or the modulation circuit.)

Note:

When closing the radome, be sure the packing does not stick out, and close the radome while avoiding dust and dirt.

---

4 Turn on the radar, and perform operation checks.

4.2.1 Magnetron MSF1421B

[Required tools]

- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



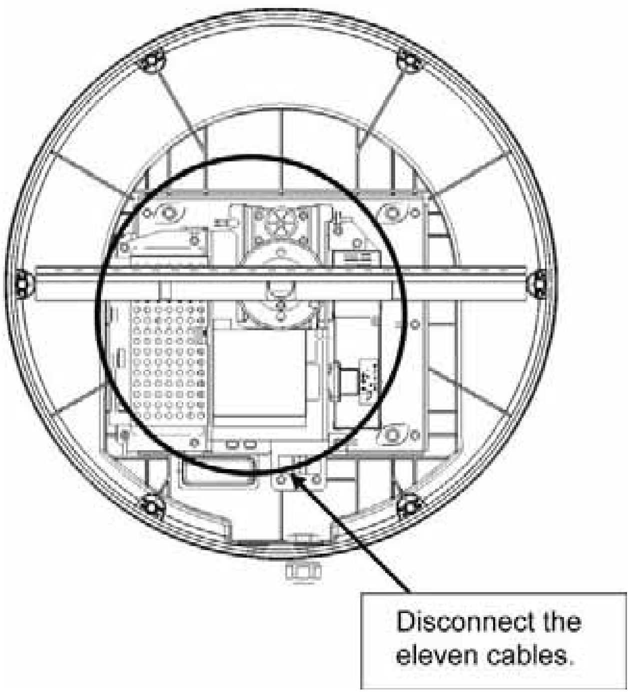
- Shielded screwdriver



- Tools for removing the scanner unit covers (See Section 4.2)

[Replacement procedure]

1 Open the radome (See Section 4.2), and disconnect the 11 cables from the transmitter-receiver unit.



Cables to be disconnected

Modulation Circuit CME-322

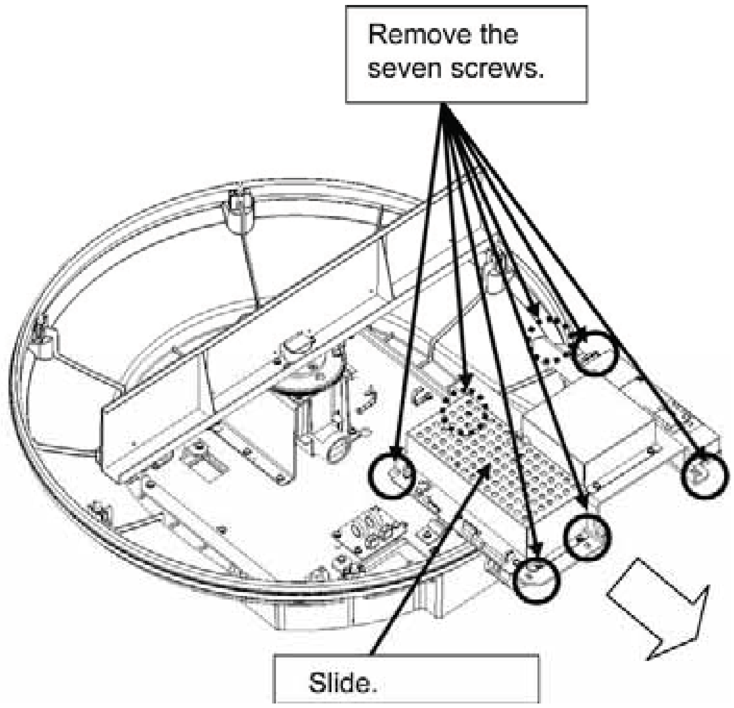
J1, J3, J4, J5, J14, J17, J201, J202

Receiver Circuit CAE-475

J2, J301, J302

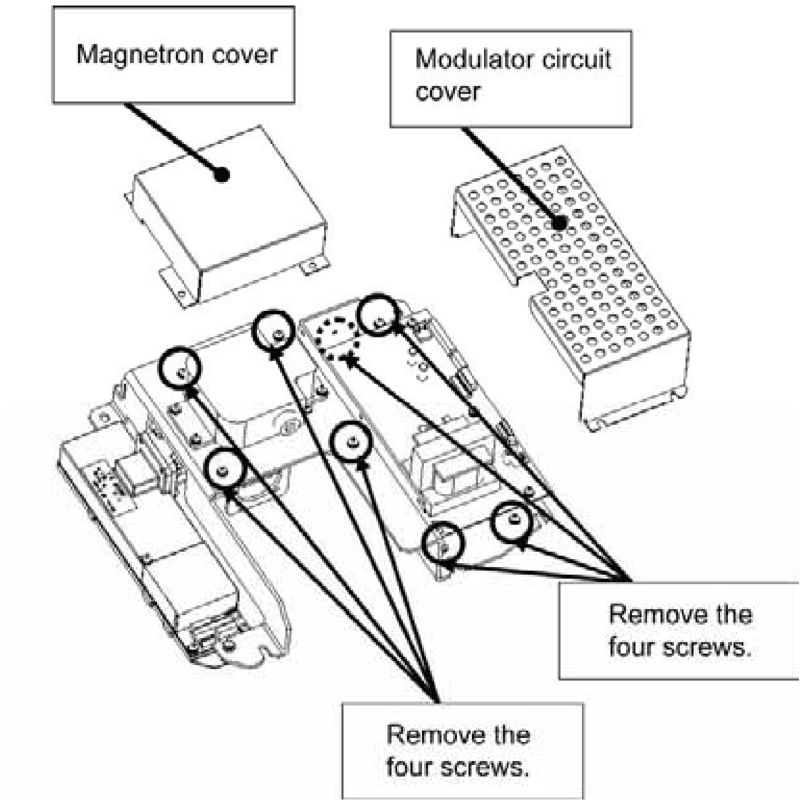
2 Remove the seven screws (M4) and remove the transmitter-receiver.

The transmitter-receiver unit can be removed by sliding it.

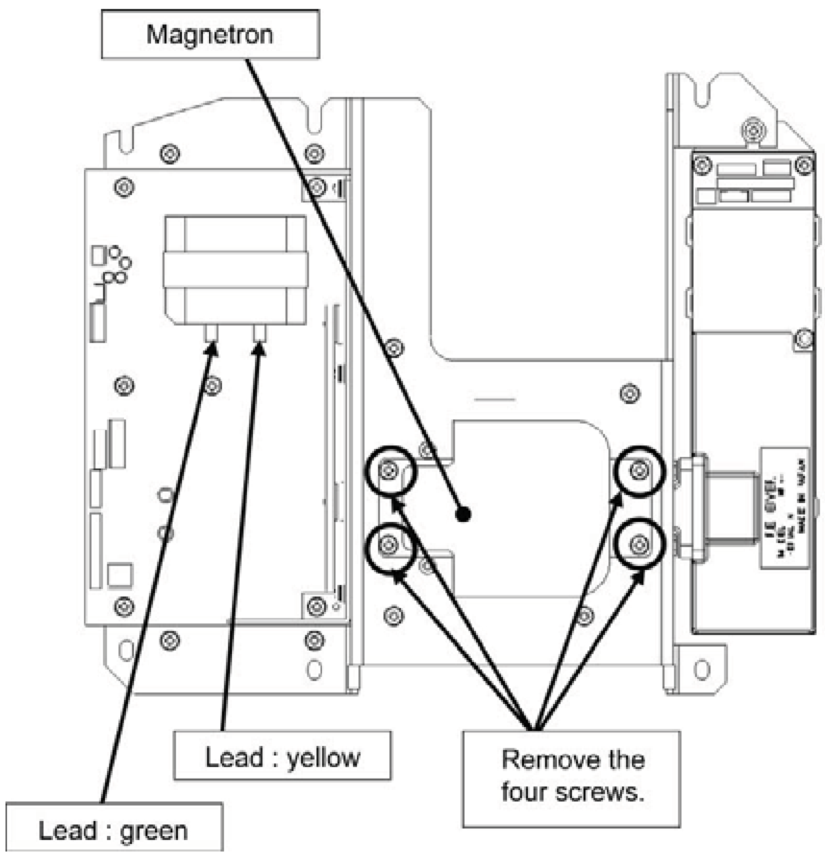


3 Remove the four screws (M4) and remove the modulation circuit cover.

4 Remove the four screws (M4) and remove the magnetron cover.



5 Remove the lead wires (yellow and green) soldered to the pulse transformer, remove the four screws (M4) holding the magnetron, then replace the magnetron.



Note:

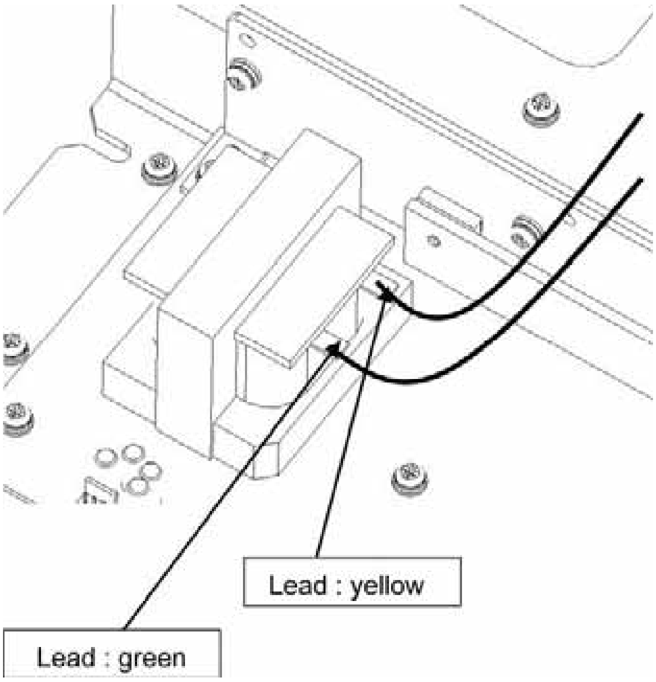
Use a shielded screw driver for magnetron replacement.

Touching the magnetron with metal (a tool) causes performance deterioration.

6 Solder the cable after cutting the leads (yellow and green) for the replacement magnetron to an appropriate length.

After the magnetron replacement, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.



Note:

- When soldering the lead of the magnetron, refer to the diagram above.
  Make sure of the mounting position of yellow and green lead wires.
- Be careful that the lead wires (yellow and green) of the magnetron do not touch other parts or the chassis.
  Bringing the lead wires into contact with them can cause the discharge.

[Operation check]

After replacement, perform the following operations.

1. Turn on the radar, and maintain it in the standby state for 20 to 30 minutes.
2. Start transmission in a short pulse range, and gradually change to longer ranges. At this time, open the service engineer menu and perform provisional tuning adjustment.
   If operation becomes unstable in the meantime, immediately change the equipment back into the standby state, leave it there for 5 to 10 minutes, and restart transmission.
3. After long range transmission for about 15 minutes, open the service engineer menu again and perform tuning adjustment.
   In the service engineer menu, perform adjustment for the tune indicator bar on the display to reach 80%.

4.2.2 Motor H-7BDRD0023

[Required tools]

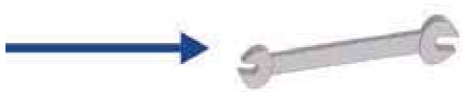
- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



- A wrench (width across flats 10mm for M6 bolts)



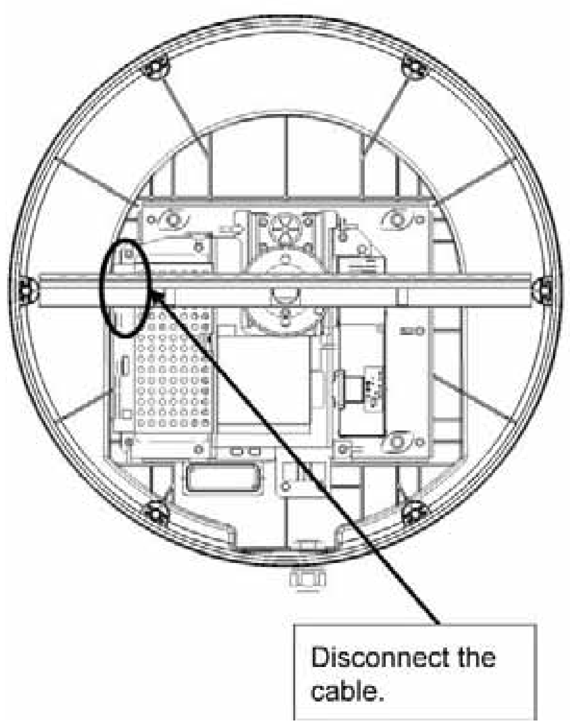
- Tools for removing the scanner unit radome (See Section 4.2)

4

Field Service Manual

[Replacement procedure]

1 Open the radome (See Section 4.2), and disconnect the motor cable from the transmitter-receiver unit.



Cables to be disconnected

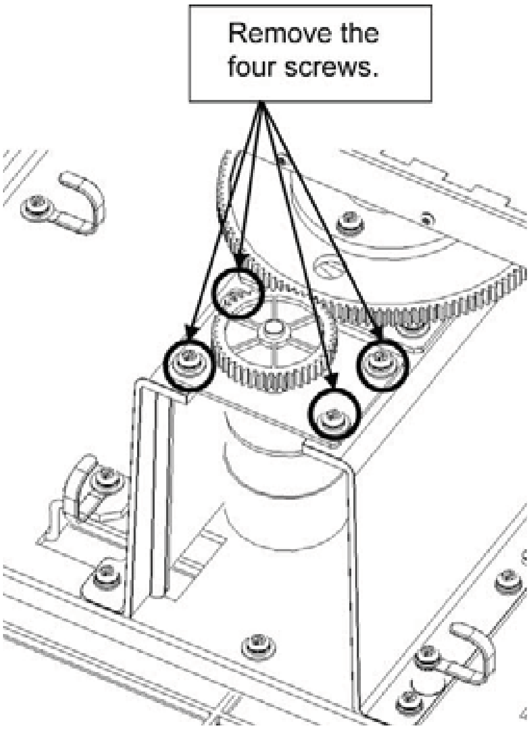
Modulation Circuit CME-322

J17

2 Remove the four screws (M4) and remove the motor.

After the motor replacement, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.



[Operation check]

After replacement, perform the following operations.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

When starting the motor rotation, check if no abnormal noise will be emitted when it is running, or when it stops.

4.2.3 Modulation Circuit CME-363

[Required tools]

- A Phillips screwdriver for M4 screws



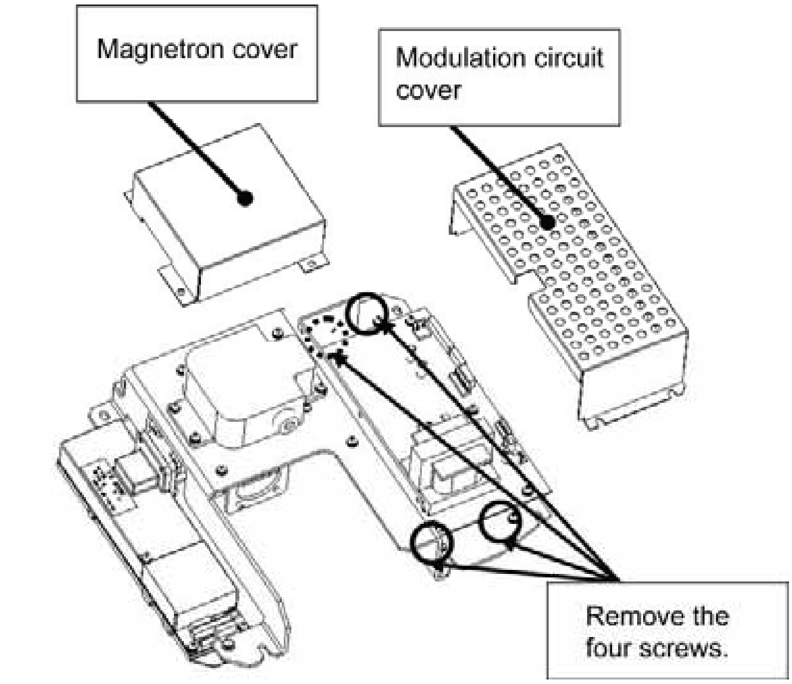
- A Phillips screwdriver for M5 screws



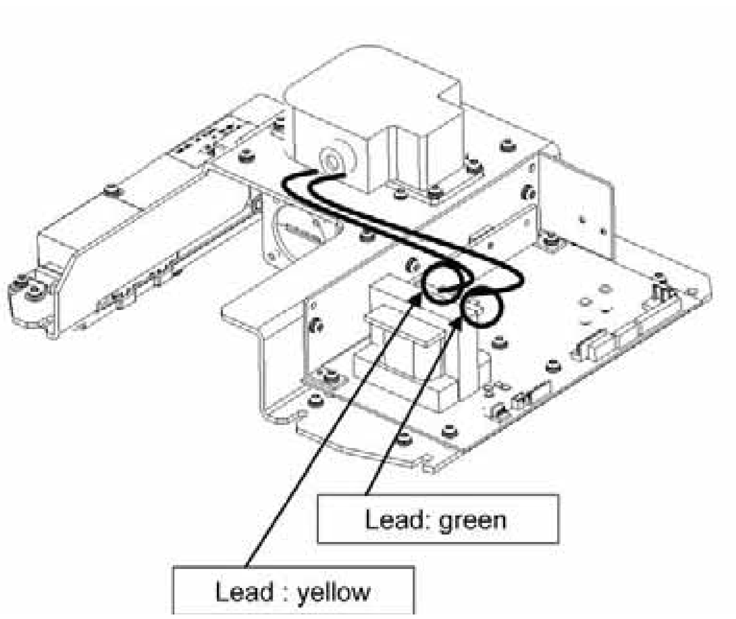
- Tools for removing the scanner unit covers (See Section 4.2)

[Replacement procedure]

1. Refer to step 1 in Section 4.2.1 to disconnect the 11 cables from the transmitter-receiver unit.
2. Refer to step 2 in Section 4.2.1 to remove the transmitter-receiver.
3. Remove the four screws (M4) and remove the modulation circuit cover.

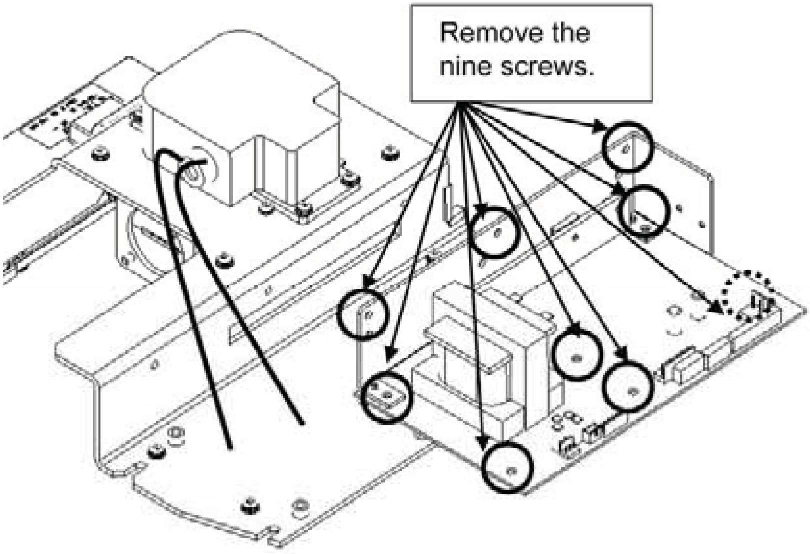


4. Remove the magnetron lead wires (yellow and green) soldered to the pulse transformer (H-7LPRD116).



5 Remove the nine screws (M4) that secure the modulation circuit, and replace the modulation circuit.

If the heat radiation plate of the modulator is used, mount the insulating sheet straight between TR1/TR13 and the heat radiation plate.



6 After the modulation circuit replacement, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.

Note:

- When soldering the lead of the magnetron, refer to the diagram above.
  Make sure of the mounting position of yellow and green lead wires.
- Be careful that the lead wires (yellow and green) of the magnetron do not touch other parts or the chassis.
  Bringing the lead wires into contact with them can cause the discharge.

[Operation check]

After replacement, perform the following operations.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

After long range transmission, open the service engineer menu, and confirm that the magnetron current indicator shows 50 to 70%.

4.2.4 Receiver NRG-225

[Required tools]

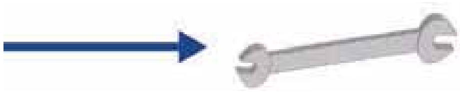
- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



- A wrench (width across flats 7 mm for M4 bolts)

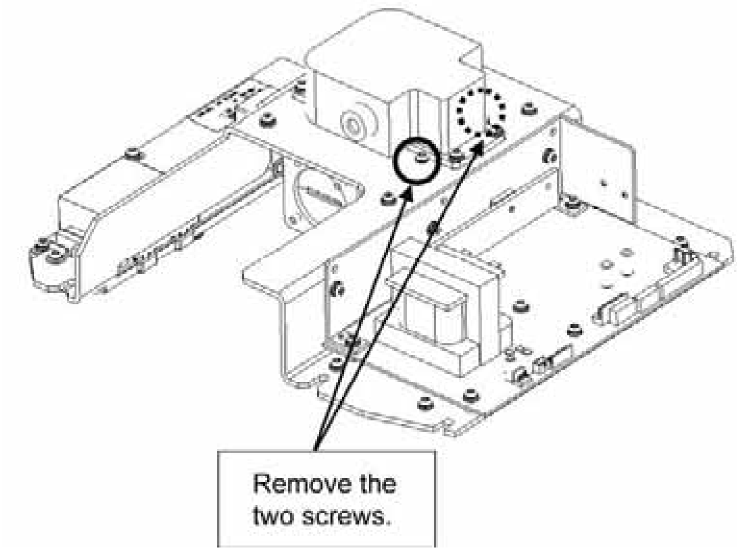


- Tools for removing the scanner unit covers (See Section 4.2)

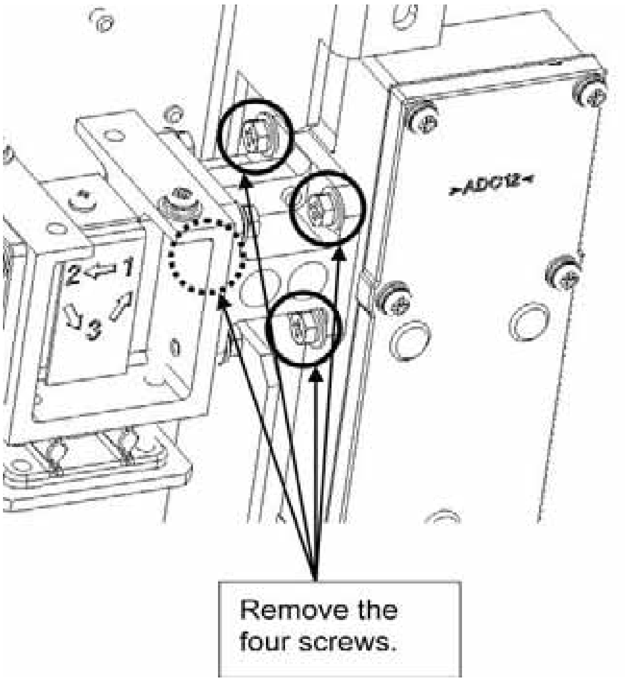
[Replacement procedure]

1. Refer to step 1 in Section 4.2.1 to disconnect the 11 cables from the transmitter-receiver unit.
2. Refer to step 2 in Section 4.2.1 to remove the transmitter-receiver.
3. Remove the 3D circuit and receiver from the transmitter-receiver unit according to the procedure below.

   a) Remove the two M4 screws near the magnetron.



b) Use a wrench to remove the four screws (M4) that secure the receiver, and replace it.



c) After the receiver replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

Note:

After receiver replacement, perform the assembly procedure, paying attention to the fitting of the transmitter-receiver unit.
If the fitting is poor, remove the screws and perform the adjustment again.

[Operation check]

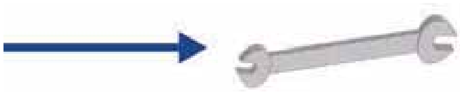
After replacement, perform the following operations.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. Transmit radar signals on a long range and open the service engineer menu to adjust the tuning. Perform the adjustment in the service engineer menu until the tuning display bar on the display unit reaches the eighth calibration mark.

4.3 Parts Replacement for the Scanner Unit NKE-2043 (JMA-3334)

[Required tools]

- Tools for removing the cover from the scanner unit
  A wrench (width across flats 8 mm for M5 bolts)

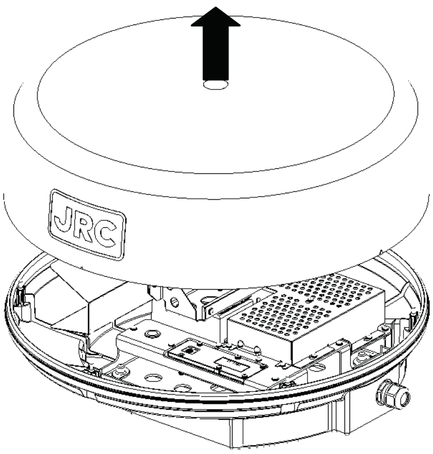


- Tools used in each part replacement procedure

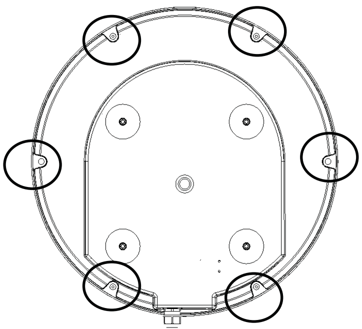
[Replacement procedure]

5 Remove the radome.

The radome is fixed with 6 hexagonal bolts.



The figure below shows the positions for 6 bolts.



Bottom view

Note:

Place the removed radome in a safe place.

Be sure not to be blown off by the wind.

6 Replace the parts, which need replacement, according to the procedures in the subsequent sections.
Be careful not to lose screws or brackets removed during replacement.

7 After replacing the parts, align the triangle mark (□) and close the radome.
(Be sure to attach the cap when replacing the magnetron or the modulation circuit.)

Note:

When closing the radome, be sure the packing does not stick out, and close the radome while avoiding dust and dirt.

---

8 Turn on the radar, and perform operation checks.

4.3.1 Magnetron MSF1421B

[Required tools]

- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



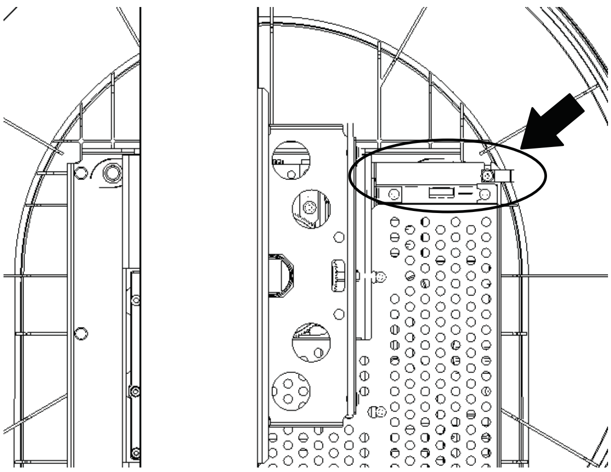
- Shielded screwdriver



- Tools for removing the scanner unit covers (See Section 4.2)

[Replacement procedure]

1 Remove the equipment cable.
Remove the connectors of the equipment cable connected to the transceiver unit.
Remove the cable clamp fixing the equipment cable.
(You do not need to remove the equipment cable from the scanner unit.)



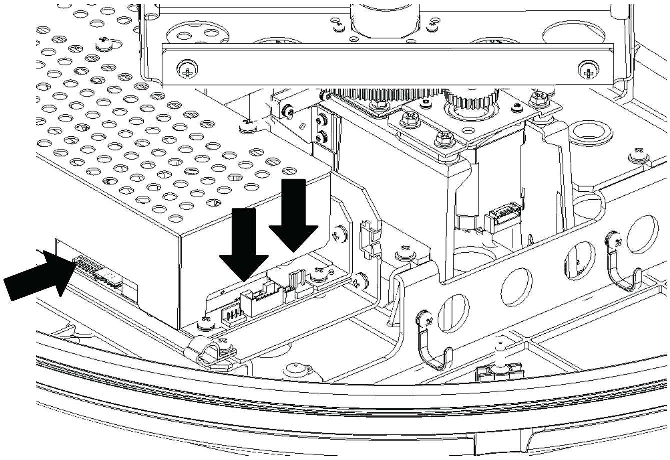
2 Remove the motor cable, the receiver cable and the sensor cable.

Remove the connection cable of the motor unit.

Remove the connection cable of the receiver unit.

Remove the connection cable of the sensor.

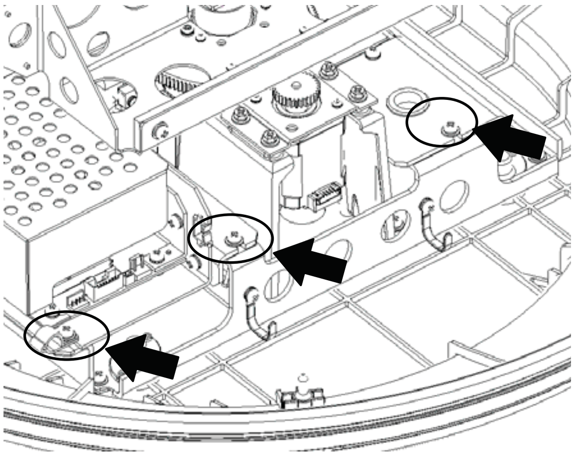
When removing the transceiver unit, be sure not to be stuck in parts and be careful not to interfere with the work.



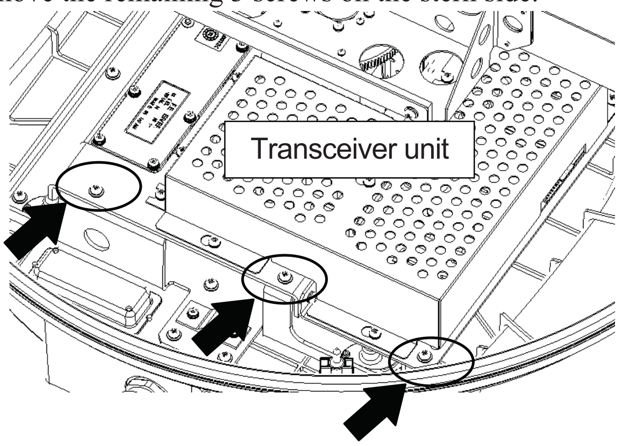
3 Remove the transceiver unit.

The transceiver unit is fixed with 5 screws with washer (M4X10Bs_SW_W) and a screw (M4X12_SW_W, fixed with clamp).

d) Loosen the 3 screw fixing the unit on the bow side.



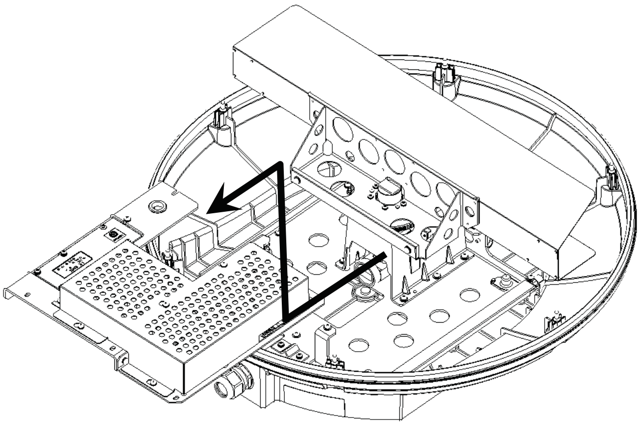
e) Remove the remaining 3 screws on the stern side.



f) Remove the transceiver unit.

When removing the transceiver unit, once slide it to stern direction and pull it off obliquely backward.

Perform the replacement of circuits within the transceiver unit in a safe place.



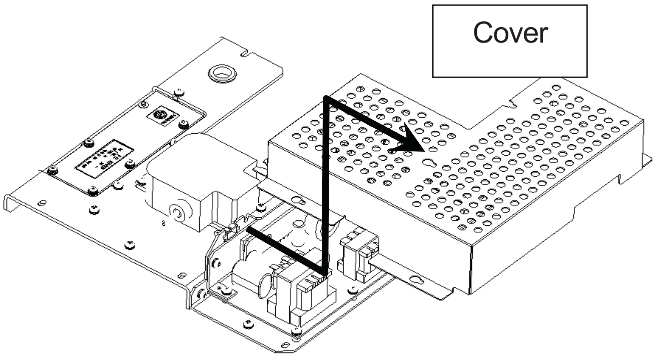
4 Remove the cover of the transceiver unit.

Perform the replacement of circuits and parts within the transceiver unit.

Remove the cover of the transceiver unit.

The cover is fixed with 7 screws with washer (M4X10Bs_SW_LW).

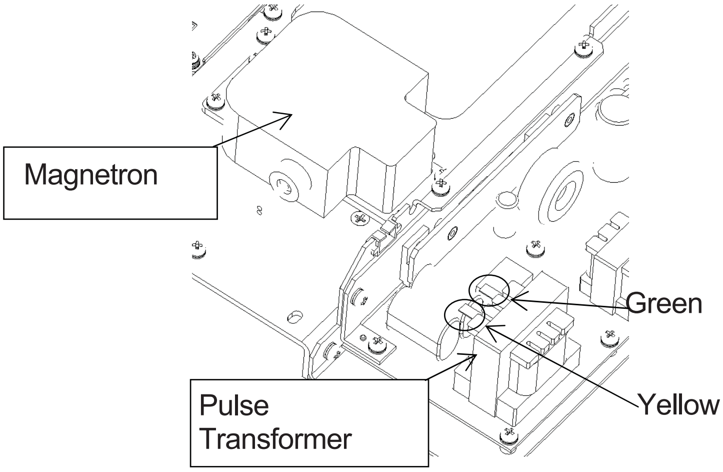
Loosen all screws and slide the cover to remove it.



5 Remove the magnetron cable.

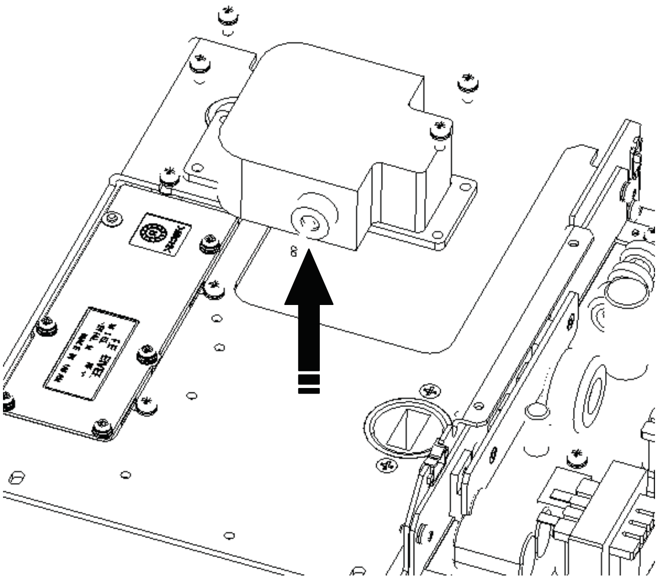
The magnetron cable is connected to the pulse transformer with two cables (green and yellow).

Remove the cables soldered to the pulse transformer pins. Reuse the protection tube.



6 Replace the magnetron.

The magnetron is fixed with 4 screws with washer (M4X10Bs_SW_LW). Remove the screws and replace the magnetron.



Note:

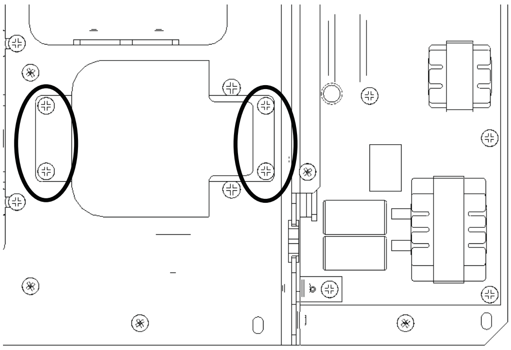
Use a shielded screw driver.

Touching the magnetron with metal (a tool) causes performance deterioration.

7 Connect the magnetron cable.

Connect the cables after fixing the magnetron.

Solder the cables to the pulse transformer pins.

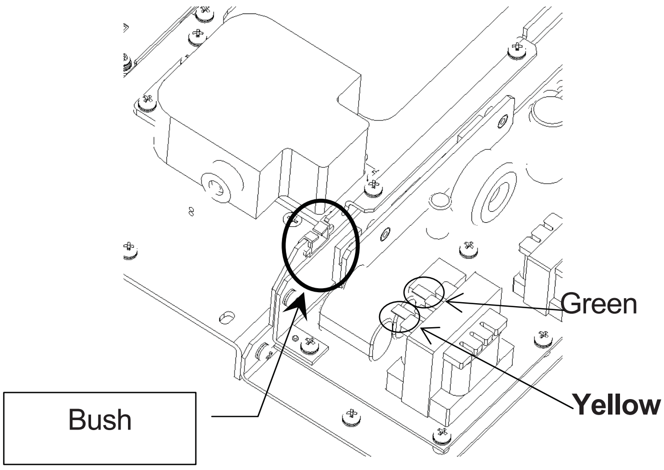


Pass the magnetron cable through the protection tube (reused).

Connect the magnetron cables as follows:

the green cable to No. 16 of the pulse transformer and

the **yellow** cable to No. 15 of the pulse transformer.



After soldering, place the cables into the bush and attach the cover.

Notes:

- Be careful not to connect cables faultily.
- Adjust the cables for optimal length.
  The recommended length is 155±5 mm.
- Use a shielded screw driver.
  Touching the magnetron with metal (a tool) causes performance deterioration.

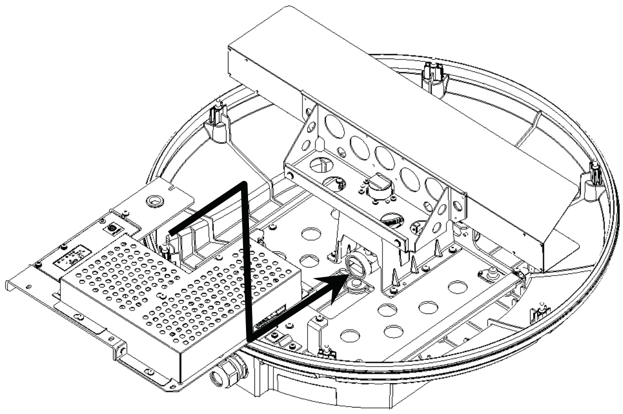
8 Install the transceiver unit into the scanner unit.

Install the transceiver unit into the scanner unit.

When installing the transceiver unit, put the unit inside, then slide it into the joint of the wave guide tube.

Push the transceiver unit wholly so that the unit and the joint of the wave guide tube stick together.

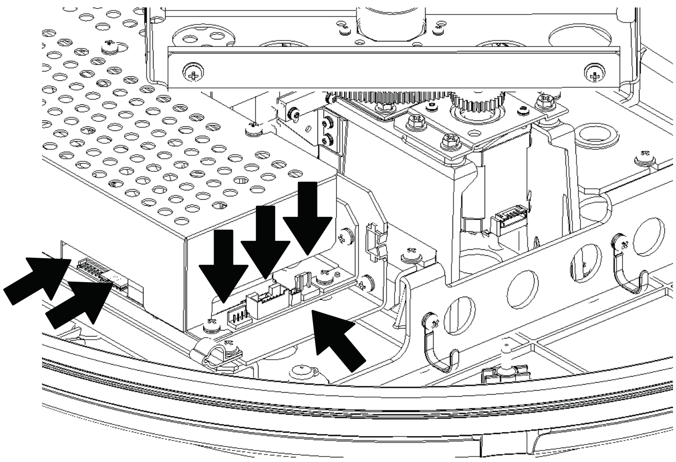
Fix the unit with screws with washer.



9 Connect the cables to the unit.

Connect the following cables.

- Motor cable: 1 connector
- Receiver cable: 1 connector
- Sensor cable: 1 connector
- Equipment cable: 3 connectors



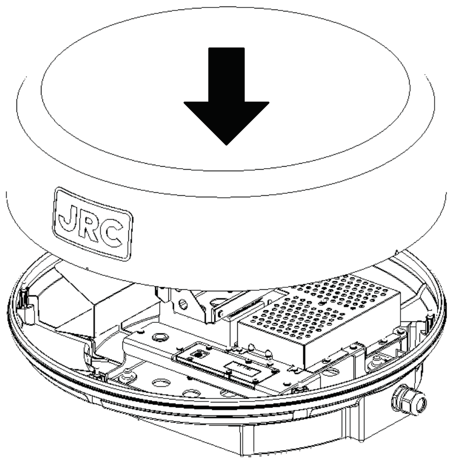
After connecting all cables, check the cables not to interfere the antenna rotation.

10 Attach the radome.

Before attaching the radome, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (10.5kgf·cm).



This completes the magnetron replacement procedure.

[Operation check]

After replacement, perform the following operations.

1 Turn on the radar, and maintain it in the standby state for 20 to 30 minutes.

2 Start transmission in a short pulse range, and gradually change to longer ranges. At this time, open the service engineer menu and perform provisional tuning adjustment.

If operation becomes unstable in the meantime, immediately change the equipment back into the standby state, leave it there for 5 to 10 minutes, and restart transmission.

3 After long range transmission for about 15 minutes, open the service engineer menu again and perform tuning adjustment.

In the service engineer menu, perform adjustment for the tune indicator bar on the display to reach 80%.

4.3.2 Motor H-7BDRD0052

[Required tools]

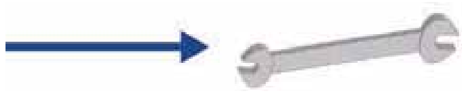
- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



- A wrench (width across flats 10mm for M6 bolts)



- Tools for removing the scanner unit radome (See Section 4.2)

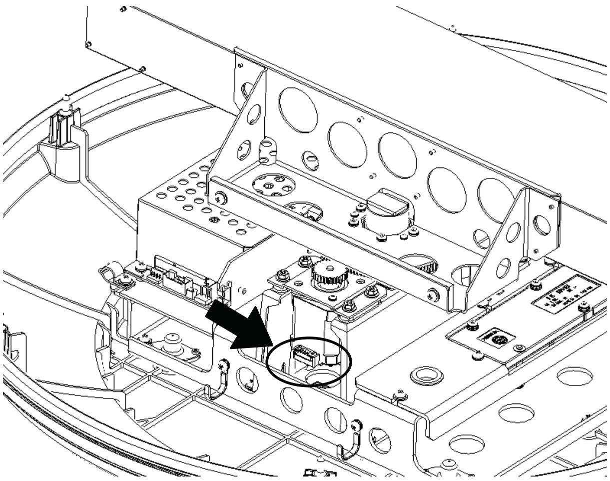
[Replacement procedure]

1 Remove the motor cable.

The motor unit is installed on the bow side of the scanner.

Remove the motor cable.

Remove the cable from the connector on the side of the motor unit.

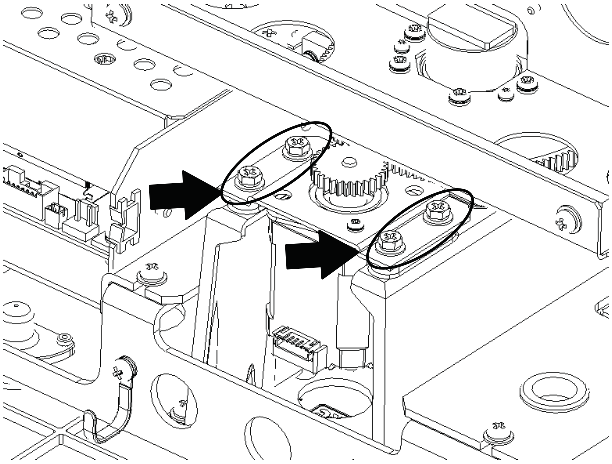


2 Remove the motor unit.

The motor unit is fixed with

4 upset head bolts with washer (M4X12SUS_SW_W).

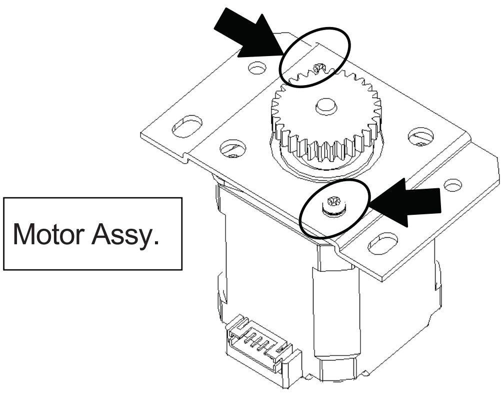
Remove the upset head bolts to remove the motor unit.



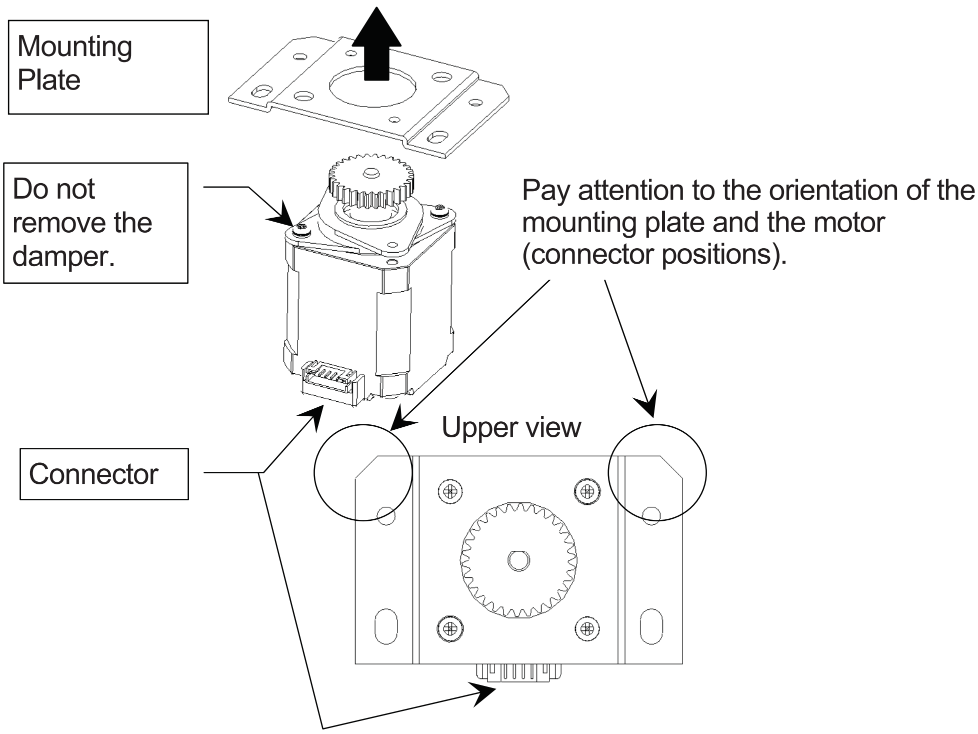
3 Replace the motor.

The motor is fixed with 2 screws with washer (M3X6Bs_SW).

a) Remove 2 screws.



b) Remove the motor for replacement.



Note:

Pay attention to the orientation of the motor.

For installation, pay attention to the orientation of the mounting plate and the motor (connector positions).

The motor connector is positioned in reverse to the chamfer of the mounting plate.

c) Install the motor into the scanner.

Be sure to tighten all the upset head bolts with specified torque.

Connect the motor cable to the connector on the motor.

After connection, check the cables not to interfere the antenna rotation.

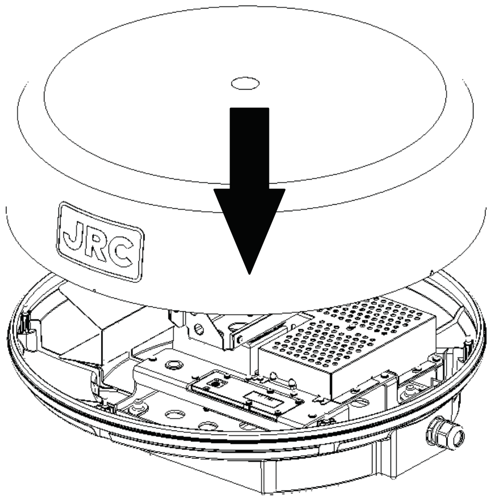
Apply grease to the gear after installing the motor.

4 Attach the radome.

Before attaching the radome, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (10.5kgf·cm).



This completes the motor replacement procedure.

[Operation check]

After replacement, perform the following operations.

5 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

When starting the motor rotation, check if no abnormal noise will be emitted when it is running, or when it stops.

4.3.3 Compound Modulator Circuit CME-385

[Required tools]

- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



- Tools for removing the scanner unit covers (See Section 4.2)

4

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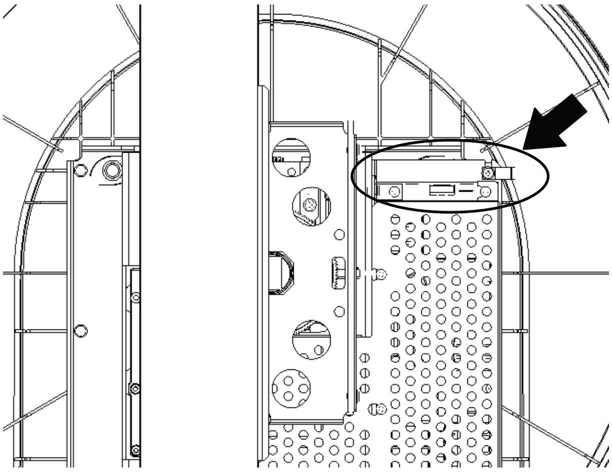
[Replacement procedure]

1 Remove the equipment cable.

Remove the connectors of the equipment cable connected to the transceiver unit.

Remove the cable clamp fixing the equipment cable.

(You do not need to remove the cable from the unit.)



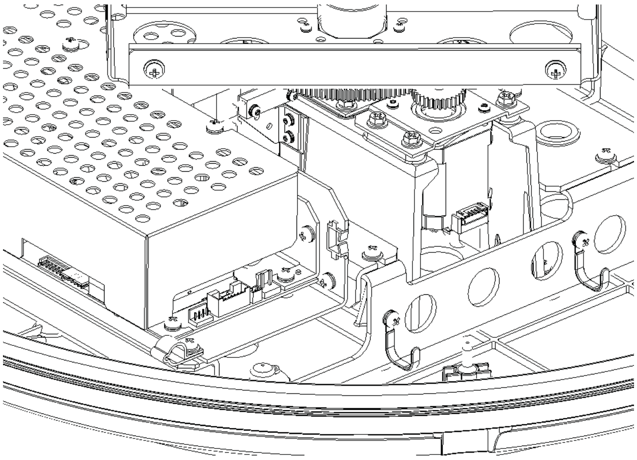
2 Remove the motor cable, the receiver cable and the sensor cable.

Remove the connection cable of the motor unit.

Remove the connection cable of the receiver unit.

Remove the connection cable of the sensor.

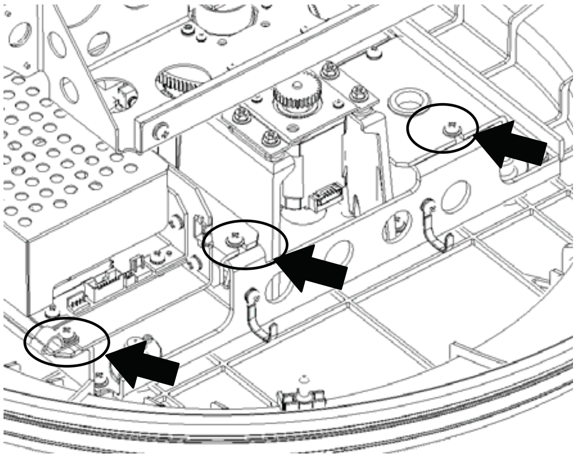
When removing the transceiver unit, be sure not to be stuck in parts and be careful not to interfere with the work.



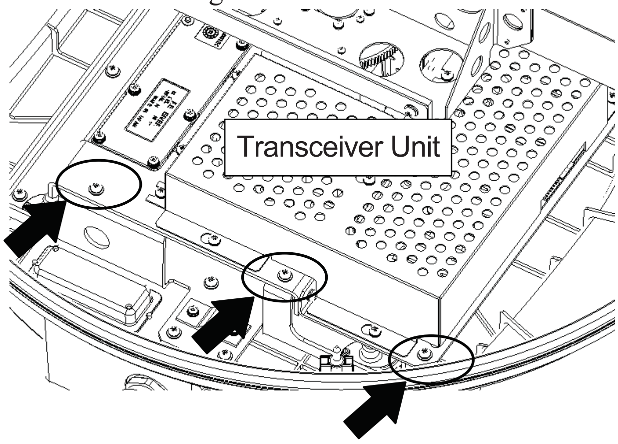
3 Remove the transceiver unit.

The transceiver unit is fixed with 5 screws with washer (M4X10Bs_SW_W) and a screw (M4X12_SW_W, fixed with clamp).

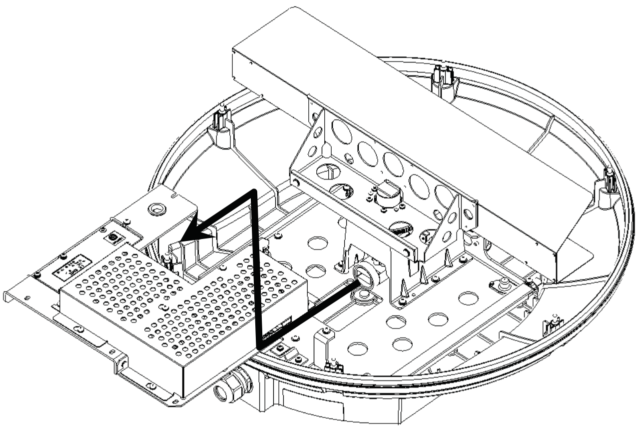
d) Loosen the 3 screw fixing the unit on the bow side.



e) Remove the remaining 3 screws on the stern side.



f) Remove the transceiver unit.
When removing the transceiver unit, once slide it to stern direction and pull it off obliquely backward.
Perform the replacement of circuits within the transceiver unit in a safe place.



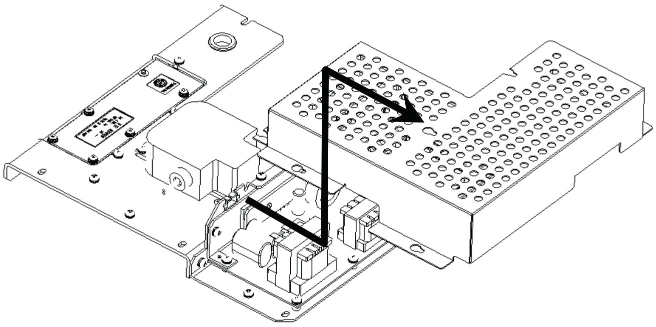
4 Remove the cover of the transceiver unit.

Perform the replacement of circuits and parts within the transceiver unit.

Remove the cover of the transceiver unit.

The cover is fixed with 7 screws with washer (M4X10Bs_SW_LW).

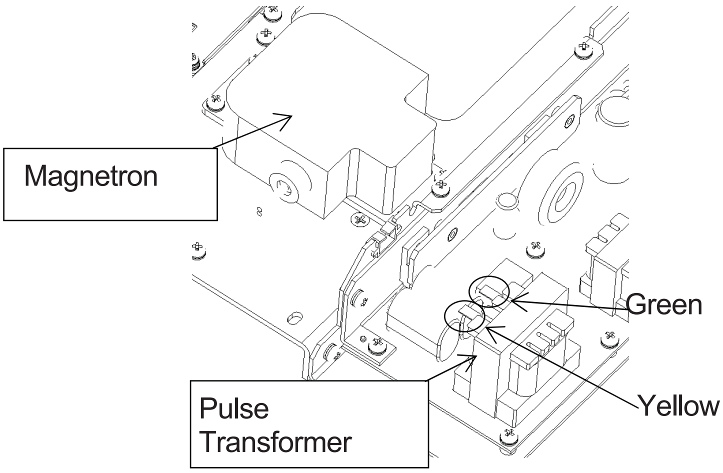
Loosen all screws and slide the cover to remove it.



5 Remove the magnetron cable.

The magnetron cable is connected to the pulse transformer with two cables (green and yellow).

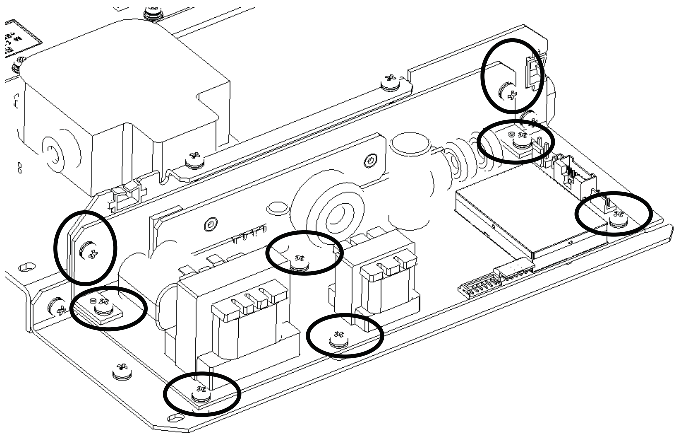
Remove the cables soldered to the pulse transformer pins.



6 Replace the compound modulation circuit (CME-385).

The compound modulation circuit is fixed with 8 screws with washer (M4X10Bs_SW_LW). Remove the screws and replace the compound modulation circuit.

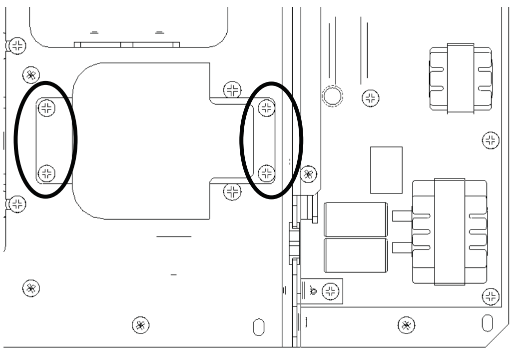
It is fixed with 6 screws on the front surface of PC plate and with 2 screws on the heat radiation plate.



7 Connect the magnetron cable.

Connect the cables after fixing the magnetron.

Solder the cables to the pulse transformer pins.

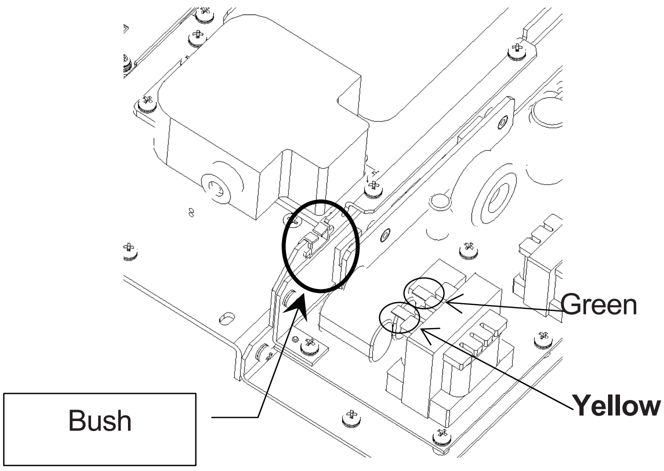


Pass the magnetron cable through the protection tube.

Connect the magnetron cables as follows:

the green cable to No. 16 of the pulse transformer and

the **yellow** cable to No. 15 of the pulse transformer.



After soldering, place the cables into the bush and attach the cover.

Notes:

- Be careful not to connect cables faultily.
- Use a new thermal conductivity sheet included in the circuit for maintenance.
- Touching the magnetron with metal (a tool) causes performance deterioration.

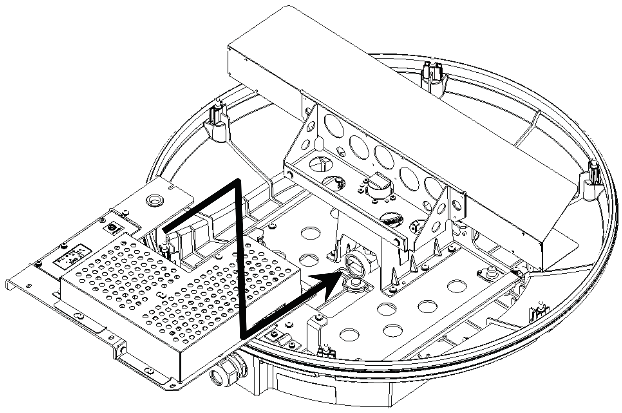
8 Install the transceiver unit into the scanner unit.

Install the transceiver unit into the scanner unit.

When installing the transceiver unit, put the unit inside, then slide it into the joint of the wave guide tube.

Push the transceiver unit wholly so that the unit and the joint of the wave guide tube stick together.

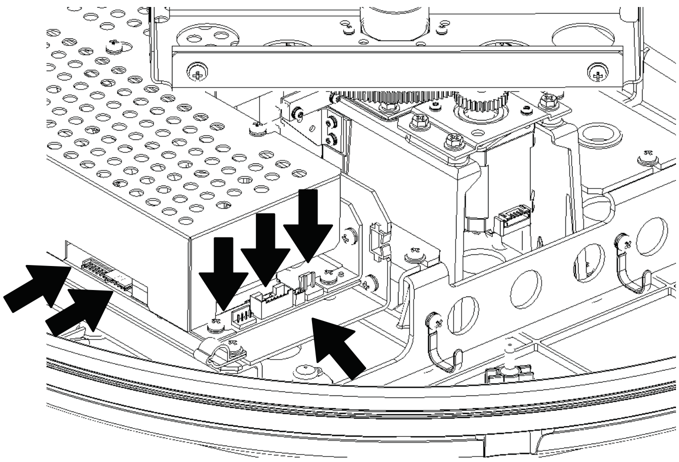
Fix the unit with screws.



9 Connect the cables to the unit.

Connect the following cables.

- Motor cable: 1 connector
- Receiver cable: 1 connector
- Sensor cable: 1 connector
- Equipment cable: 3 connectors



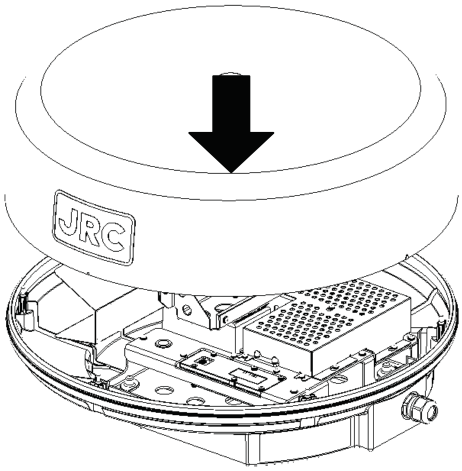
After connecting all cables, check the cables not to interfere the antenna rotation.

10 Attach the radome.

Before attaching the radome, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (10.5kgf·cm).



Note:

- When soldering the lead of the magnetron, refer to the diagram above.
  Make sure of the mounting position of yellow and green lead wires.
- Be careful that the lead wires (yellow and green) of the magnetron do not touch other parts or the chassis.
  Bringing the lead wires into contact with them can cause the discharge.

[Operation check]

After replacement, perform the following operations.

11 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

After long range transmission, open the service engineer menu, and confirm that the magnetron current indicator shows 50 to 70%.

4.3.4 Receiver NRG-239

[Required tools]

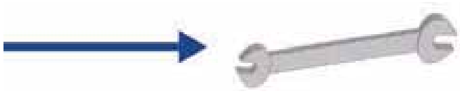
- A Phillips screwdriver for M4 screws



- A Phillips screwdriver for M5 screws



- A wrench (width across flats 7 mm for M4 bolts)



- Tools for removing the scanner unit covers (See Section 4.2)

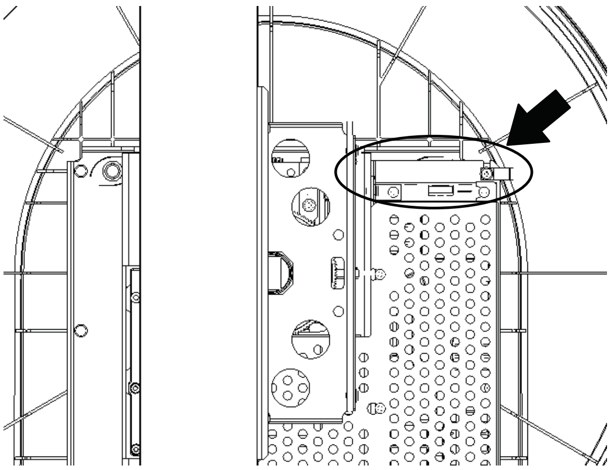
[Replacement procedure]

1 Remove the equipment cable.

Remove the connectors of the equipment cable connected to the transceiver unit.

Remove the cable clamp fixing the equipment cable.

(You do not need to remove the equipment cable from the scanner unit.)



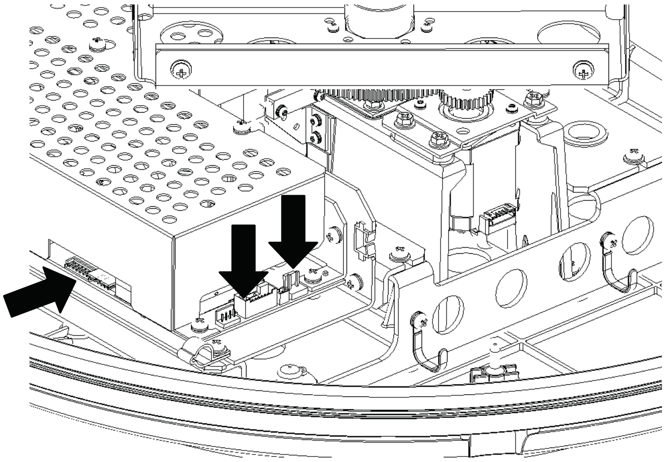
2 Remove the motor cable, the receiver cable and the sensor cable.

Remove the connection cable of the motor unit.

Remove the connection cable of the receiver unit.

Remove the connection cable of the sensor.

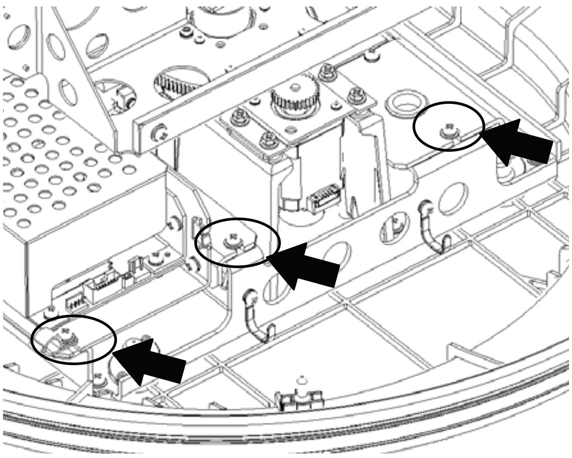
When removing the transceiver unit, be sure not to be stuck in parts and be careful not to interfere with the work.



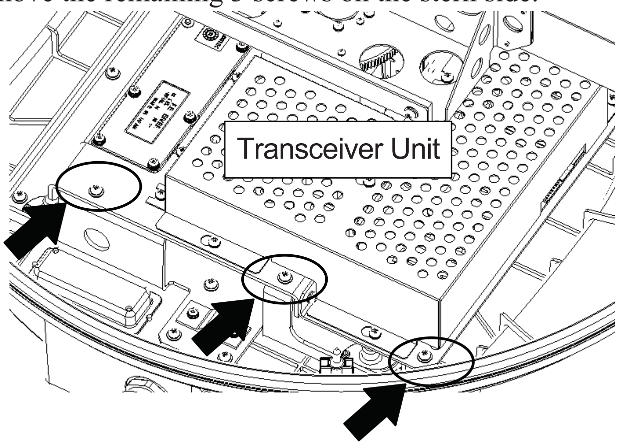
3 Remove the transceiver unit.

The transceiver unit is fixed with 5 screws with washer (M4X10Bs_SW_W) and a screw (M4X12_SW_W, fixed with clamp).

g) Loosen the 3 screw fixing the unit on the bow side.



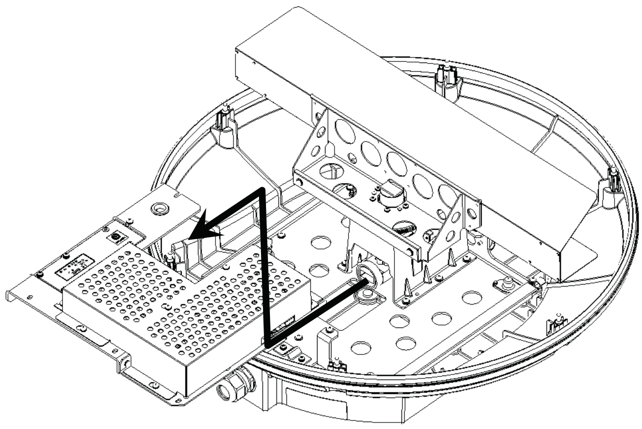
h) Remove the remaining 3 screws on the stern side.



i) Remove the transceiver unit.

When removing the transceiver unit, once slide it to stern direction and pull it off obliquely backward.

Perform the replacement of circuits within the transceiver unit in a safe place.



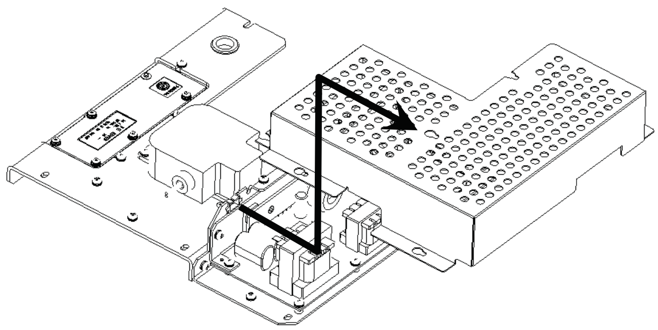
4 Remove the cover of the transceiver unit.

Perform the replacement of circuits and parts within the transceiver unit.

Remove the cover of the transceiver unit.

The cover is fixed with 7 built-in M4X10Bs_SW_LW screws.

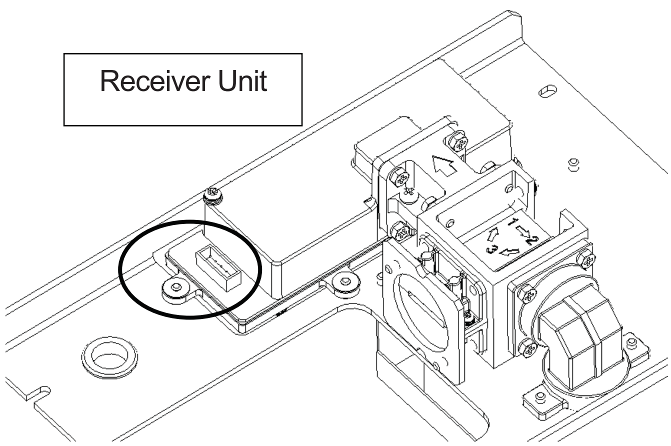
Loosen all screws and slide the cover to remove it.



5 Remove the receiver cable.

The receiver cable will be found on the rear side of the transceiver unit.

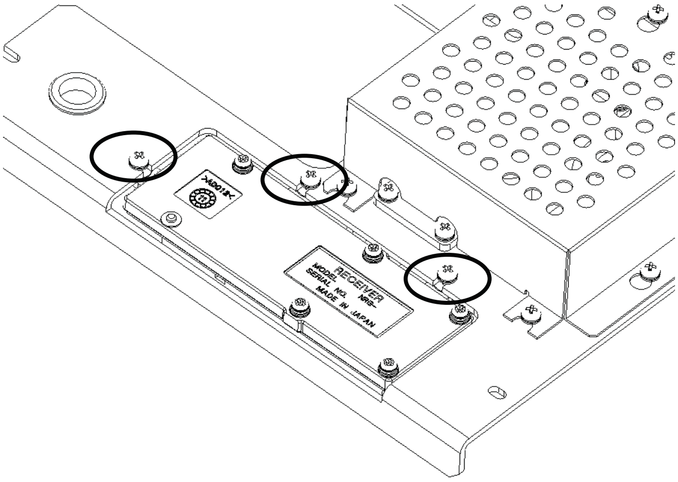
Remove the cable from the connector of the receiver.



6 Remove the screws fixing the receiver.

The receiver is fixed with 7 screws; 3 screws for fixing the unit and 4 screws on the 3D circuit.

The unit is fixed with 3 screws with washer (M4X10Bs_SW_LW). Remove those screws.



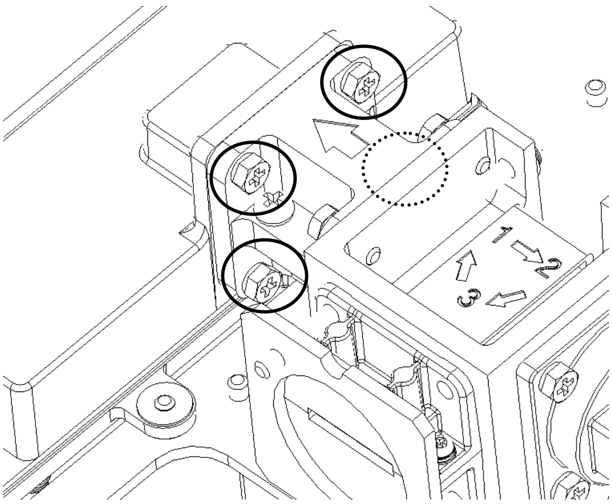
7 Remove the screws on the 3D circuit.

Then, continue the work after turning the transceiver unit over.

Remove the screws fixing the receiver on the 3D circuit.

The receiver is fixed with 4 upset head bolts with washer (M4X12SUS_SW). Remove the bolts and replace the receiver.

After replacement of the receiver, assemble the transceiver unit in reverse order of disassembly.



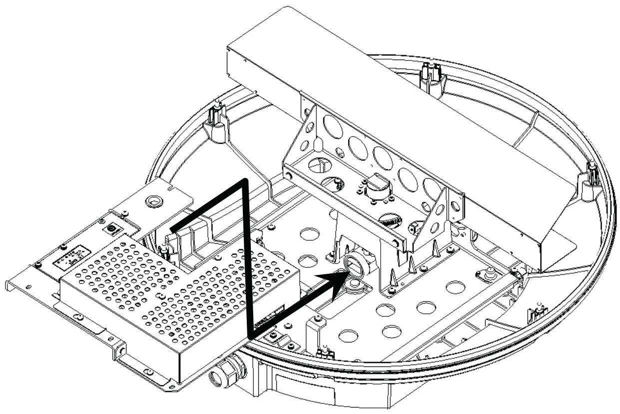
8 Install the transceiver unit into the scanner unit.

Install the transceiver unit into the scanner unit.

When installing the transceiver unit, put the unit inside, then slide it into the joint of the wave guide tube.

Push the transceiver unit wholly so that the unit and the joint of the wave guide tube stick together.

Fix the unit with screws.

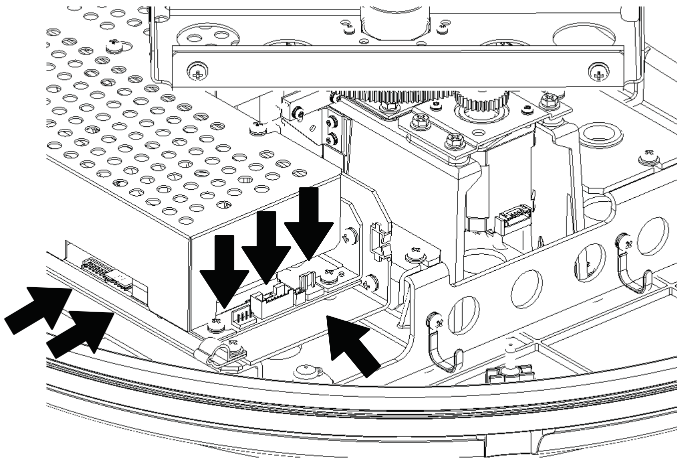


9 Connect the cables to the transceiver unit.

Connect the following cables.

- Motor cable: 1 connector
- Receiver cable: 1 connector
- Sensor cable: 1 connector
- Equipment cable: 3 connectors

After connecting all cables, check the cables not to interfere the antenna rotation.

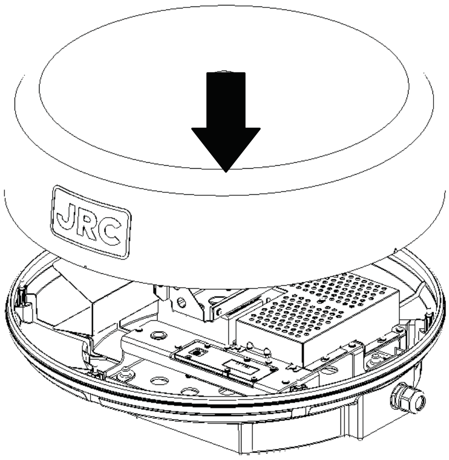


10 Attach the radome.

Before attaching the radome, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (10.5kgf·cm).



This completes the receiver replacement procedure.

[Operation check]

After replacement, perform the following operations.

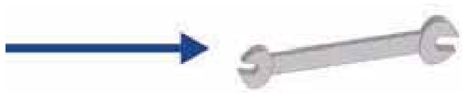
11 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. Transmit radar signals on a long range and open the service engineer menu to adjust the tuning. Perform the adjustment in the service engineer menu until the tuning display bar on the display unit reaches the eighth calibration mark.

4.4 Parts Replacement for the Scanner Unit NKE-2062 (JMA-3316/HS)

[Required tools]

- Tools for removing the cover from the scanner unit

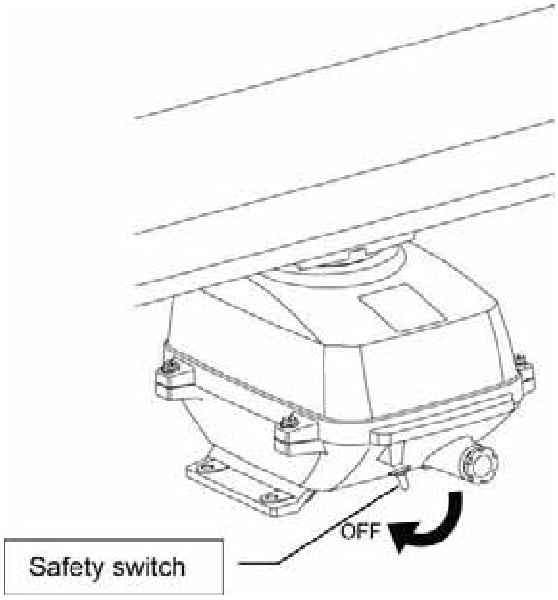
  A wrench (width across flats 13 mm for M8 bolts)



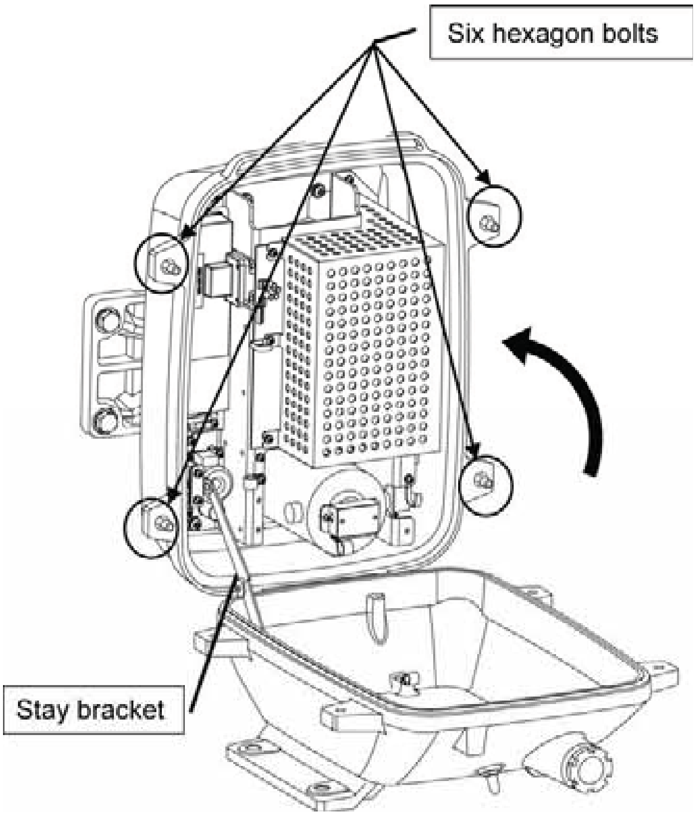
- Tools used in each part replacement procedure

[Replacement procedure]

1 Turn off the safety switch at the bottom of the scanner unit.



2 Loosen the four hexagon bolts, and open the top cover until the stay bracket stopper works.



3 Replace the parts, which need replacement, according to the procedures in the subsequent sections.

4 After the parts replacement, close the top cover, set the safety switch to ON (Be sure to cap the safety switch.).

The packing shall be clean, free from dust and dirt when you close the cover.

5 Turn on the radar, and perform necessary operation checks.

4.4.1 Magnetron MSF1422B

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- Tools for removing the scanner unit covers (See Section 4.4)

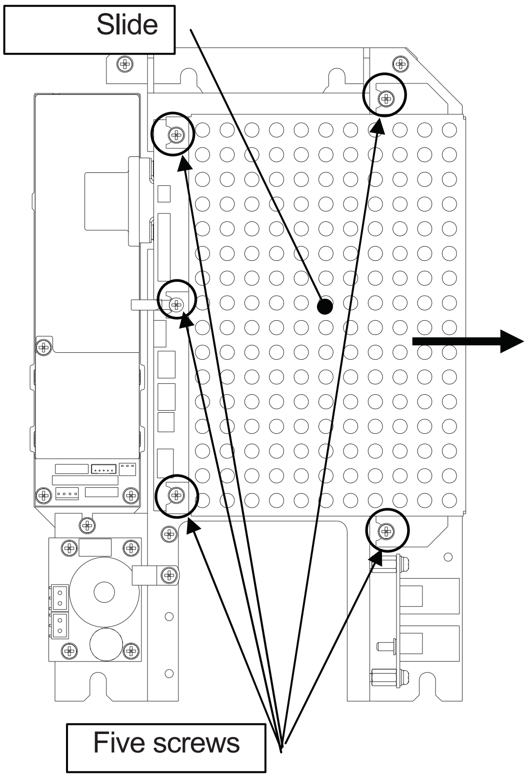
4

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[Replacement procedure]

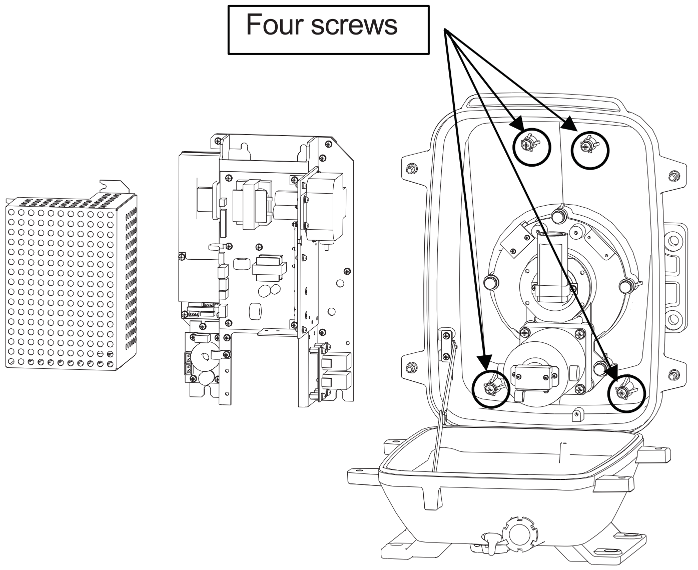
1 Open the top cover (see Section 4.4), loosen thefive screws (M4), remove the transmitter-receiver unit cover, and disconnect the ten cables from the transmitter-receiver unit.

The transmitter-receiverunit cover can be removed by sliding it.

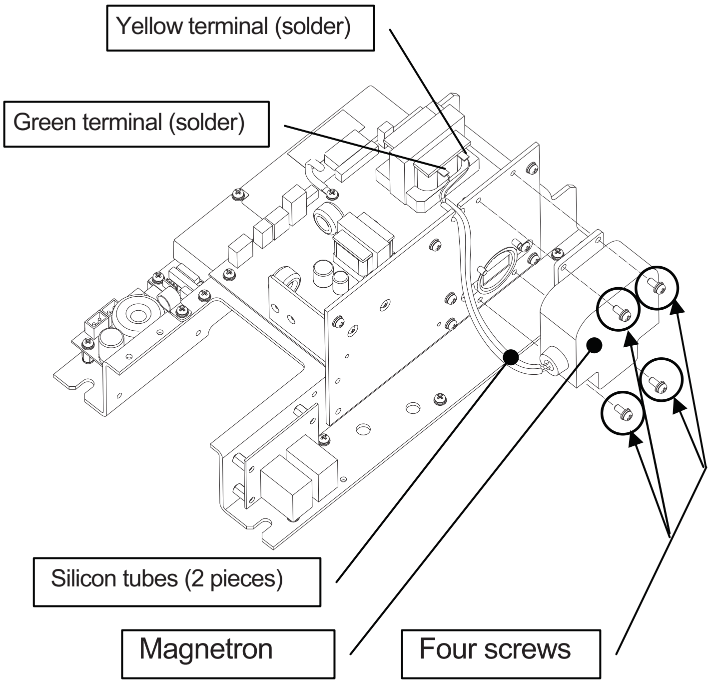


2 Loosen the four bolts (M5), and remove the transmitter-receiver unit.

The transmitter-receiver unit can be removed by sliding it upward.



3 Remove the six screws (M4) that secure the magnetron, and replace the magnetron.



Note:

A shielded screwdriver shall be used for magnetron replacement.
Touching the magnetron with metal (a tool) causes performance deterioration.

4 Adjust the lead wires (yellow and green) of the new magnetron to an appropriate length, and tighten the screws to secure the cables.

After the magnetron replacement, carry out the work in reverse order of removal.
Be sure to tighten all the bolts and screws and connect all the cables.

Note:

Be careful that the lead wires (yellow and green) of the magnetron do not touch other parts or the chassis.
Bringing the lead wires into contact with them can cause the discharge.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar, and allow sufficient preheating time (about 20 to 30 minutes in the STBY state).
2. Start transmission in a short pulse range, and gradually change to longer ranges. At this time, open the service engineer menu and perform provisional tuning adjustment.
   If operation becomes unstable in the meantime, immediately change the equipment back into the STBY state, leave it there for 5 to 10 minutes, and restart transmission.
3. After long range transmission for about 15 minutes, open the service engineer menu again and perform tuning adjustment.
   In the service engineer menu, perform adjustment for the tune indicator bar on the display to reach 80%.
   In the service engineer menu, also confirm that the magnetron current indicator shows 50 to 70%.

4.4.2 Motor CBP-153

[Required tools]

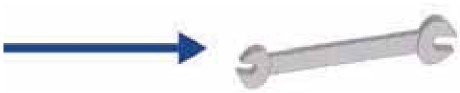
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



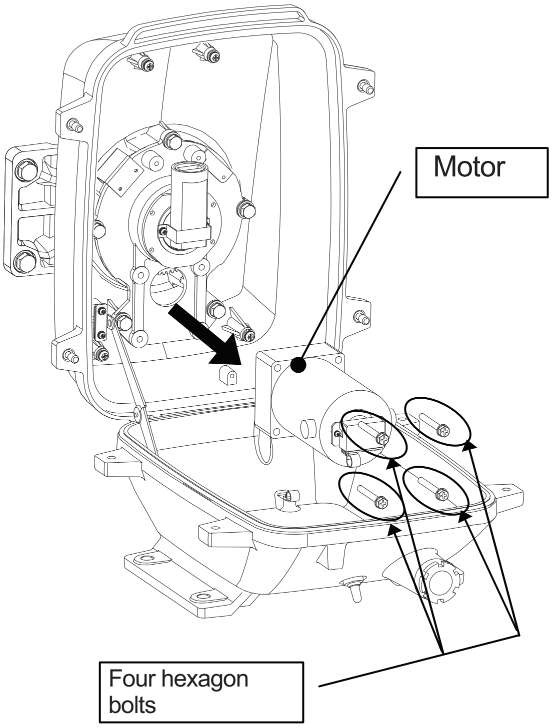
- A single-ended wrench (width across flats 10 mm for M6 bolts)



- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1. Open the top cover (see Section 4.4), And remove the transmitter-receiver unit (see Section 4.4.1).
2. Remove the four hexagon bolts (M6), and remove the motor. Apply grease to the gear of the new motor, and install the motor in the chassis. Be sure to tighten all the four hexagon bolts with specified torque (72 kgf-cm).



3. After the motor replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

Note:

The rotor of the motor rotates, so clamp the cables not to touch the rotor.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. There shall be no abnormal noise emitted when the motor starts running, when it is running, or when it stops.

4.4.3 Modulation Circuit CME-323

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



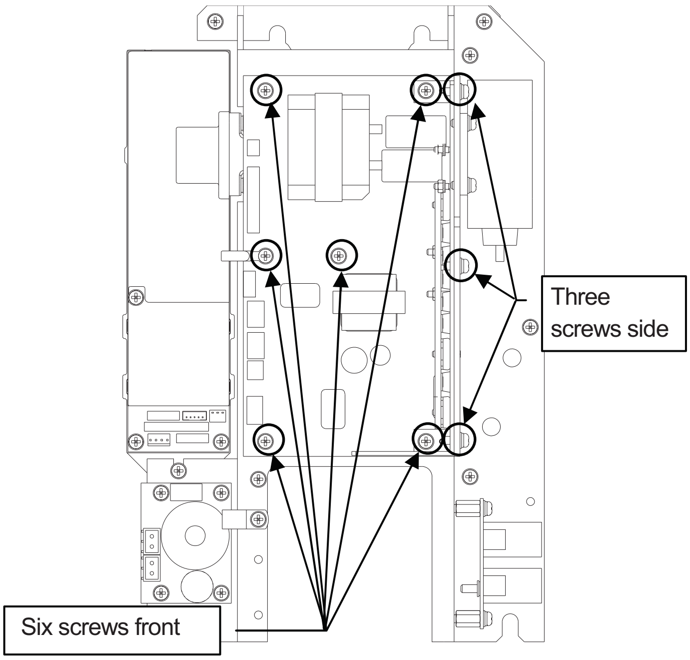
- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1 Open the top cover (see Section 4.4), And remove the transmitter-receiver unit (see Section 4.4.1).

2 Disconnect the cables from the modulator, remove the nine screws (M4) that secure the modulator, and replace it.

If the heat radiation plate of the modulator is used, mount the insulating sheet straight between TR17/TR18 and the heat radiation plate.



3 After the modulator replacement, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

4.4.4 Receiver NRG-226

[Required tools]

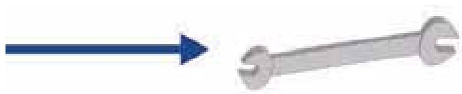
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- A single-ended wrench (Width across flats 7 mm for M4 bolts)



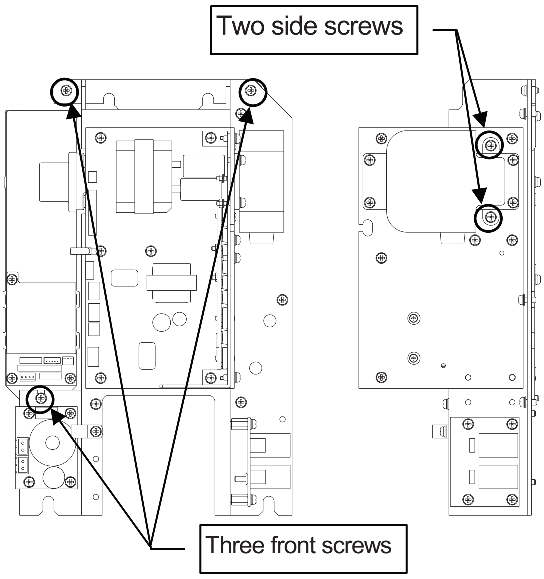
- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1 Open the top cover (see Section 4.4), And remove the transmitter-receiver unit (see Section 4.4.1). After that, remove the magnetron (see Section 4.4.1).

2 Remove the 3D circuit and receiver from the transmitter-receiver unit according to the procedure below.

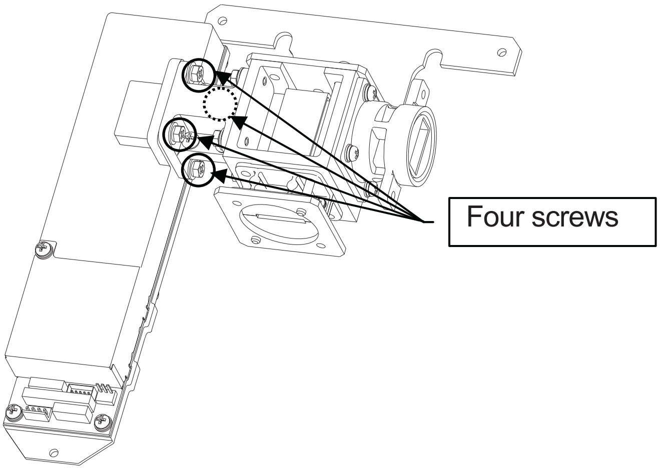
a) Remove the five screws (M4) that Secure the 3D circuit, and detach the 3D circuit from the mounting plate.



4

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b) Remove the four screws (M4) that secure the receiver, and replace it.



3 After the receiver replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

Note:

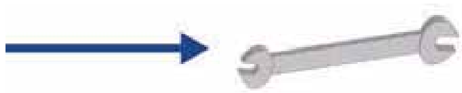
After receiver replacement, perform the assembly procedure, paying attention to the fitting of the transmitter-receiver unit. If the fitting is poor, loosen the screws and perform the adjustment again.

4.5 Parts Replacement for the Scanner Unit NKE-2063 (JMA-3336)

[Required tools]

- Tools for removing the cover from the scanner unit

  A wrench (width across flats 13 mm for M8 bolts)



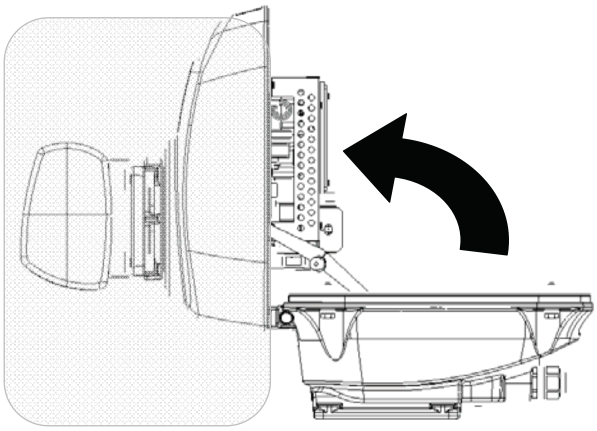
- Tools used in each part replacement procedure

[Replacement procedure]

1 Open the upper housing.

c) Open or close the scanner unit by turning the upper housing (including the antenna) to the bow side.

The gray area shown in the figure below must be clear.



Notes:

- Check if you can open or close safely for work.
- Be careful with the antenna behavior when opening or closing.
  Be careful with the antenna not to hit the mast or platform.
- Open it slowly. Do not apply too much force to the stay, otherwise, it may break.

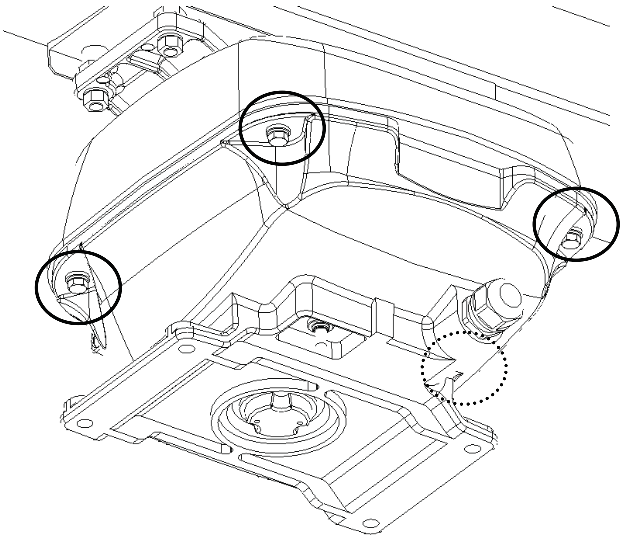
The upper housing is fixed with 4 M8 hexagonal bolts.

4

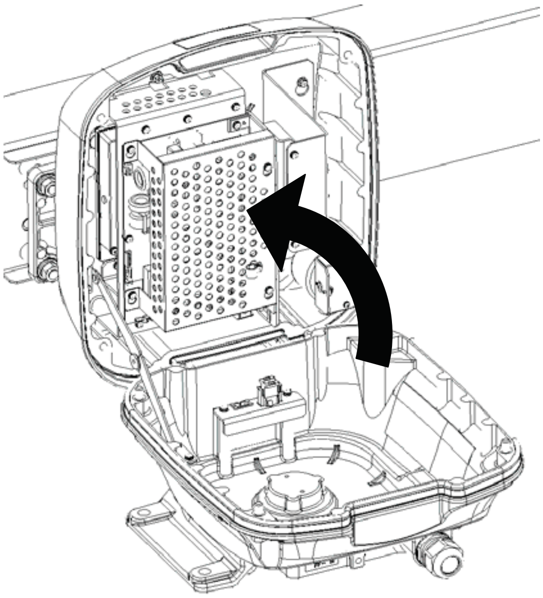
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d) Loosen those hexagonal bolts.

(Bolts are falling-out prevention bolts.)



e) Open the upper housing by rotating upward to the bow side.



Note:

Check if the upper housing is stable while opened.

If it is unstable, it will be dangerous while working.

2 Replace the parts, which need replacement, according to the procedures in the subsequent sections.

3 After the parts replacement, close the top cover, set the safety switch to ON (Be sure to cap the safety switch.).

The packing shall be clean, free from dust and dirt when you close the cover.

4 Turn on the radar, and perform necessary operation checks.

4.5.1 Magnetron MSF1422B

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1 Remove the transceiver unit.

The transceiver unit is installed in the port side of the scanner.

Remove each cable connected to the transceiver unit.

Remove the equipment cable.

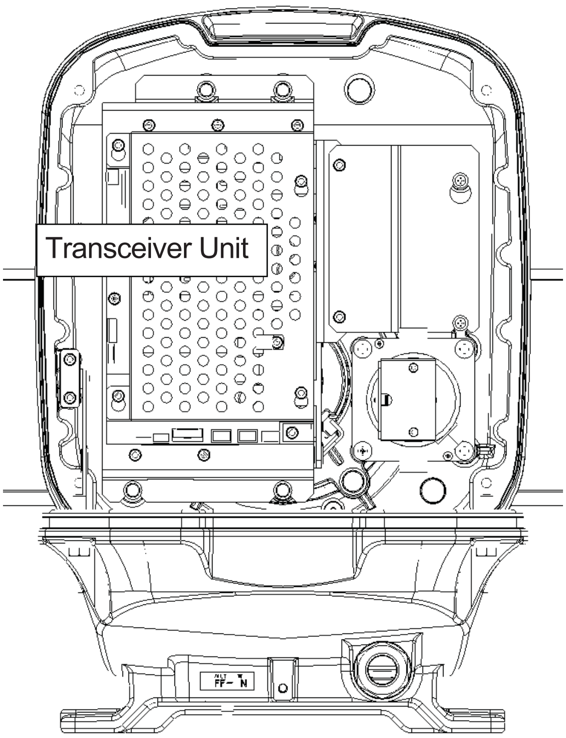
Remove the motor cable.

Remove the sensor cable.

Remove the safety switch cable.

The transceiver unit is fixed with 4 upset head bolts with washer (M5X16SUS_SW_W) and 2 upset head bolts with washer (M4X10SUS_SW_W).

Loosen those bolts.

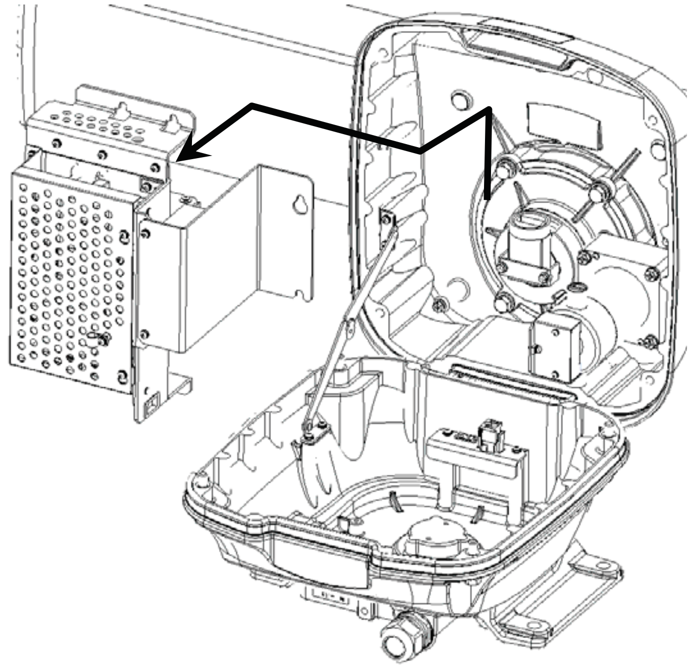


2 Remove the transceiver unit.

Remove the transceiver unit.

When removing the transceiver unit, once slide it to upper direction and pull it off.

Perform the replacement of circuits within the transceiver unit in a safe place.



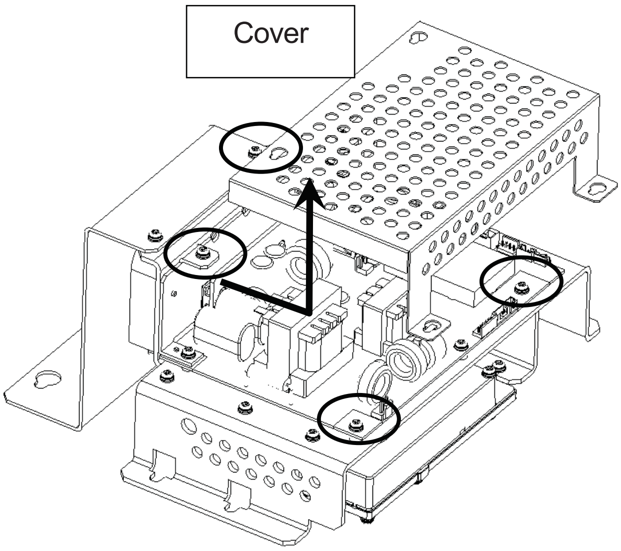
3 Remove the cover of the transceiver unit.

Perform the replacement of circuits and parts within the transceiver unit.

Remove the cover of the transceiver unit.

The cover is fixed with 4 built-in M4X10Bs_SW_LW screws.

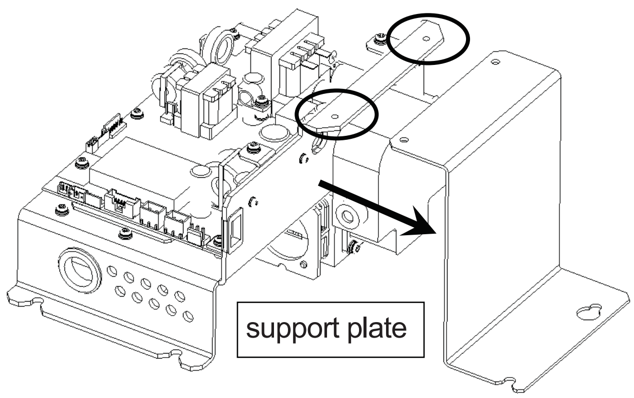
Loosen all screws and slide the cover to remove it.



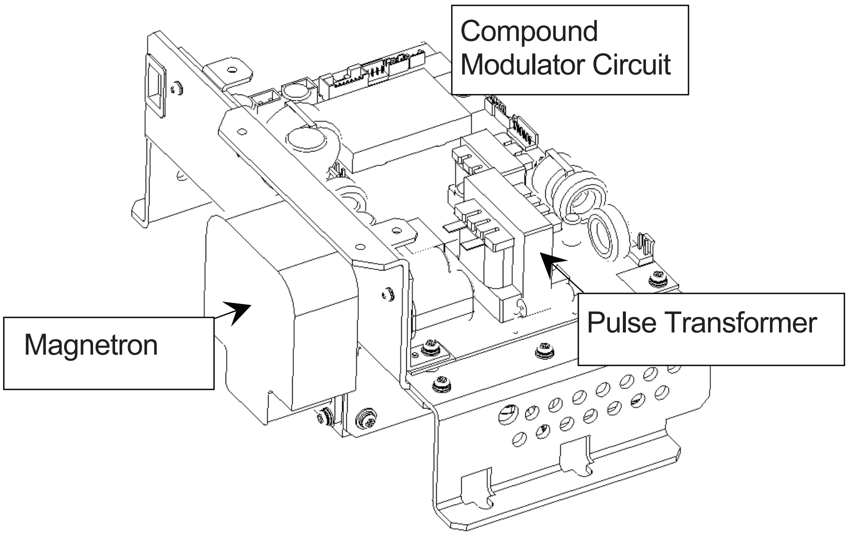
4 Remove the support plate of the transceiver unit.

The support plate is fixed with 2 screws with washer (M4X10Bs_SW_LW).

Remove all screws and slide the support plate to remove it.



Cover and support plate removed

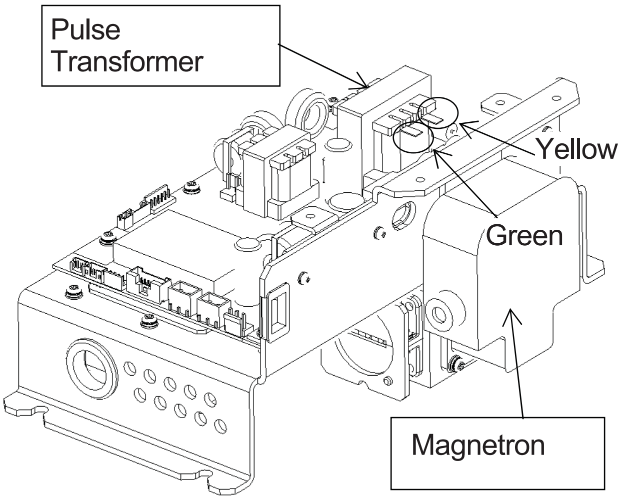


5 Remove the magnetron cable.

The magnetron cable is connected to the pulse transformer with two cables (green and yellow).

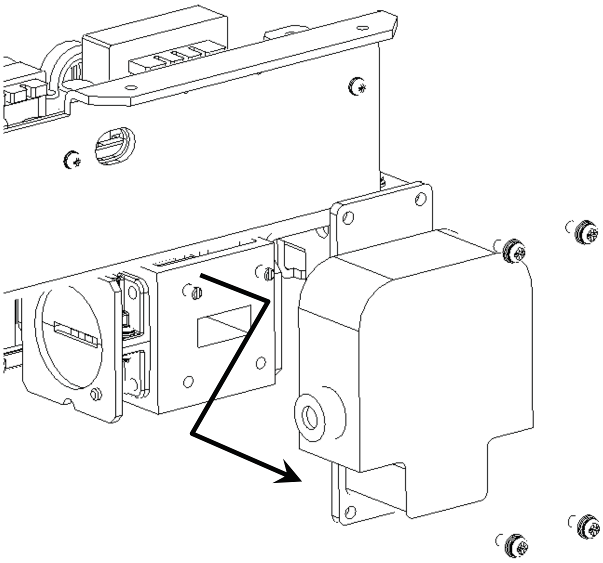
Remove the cables soldered to the pulse transformer pins.

Reuse the protection tube.



6 Replace the magnetron.

The magnetron is fixed with 4 built-in M4X10Bs_SW_LW screws. Loosen the screws and replace the magnetron.



Note:

Use a shielded screw driver.

Touching the magnetron with metal (a tool) causes performance deterioration.

7 Connect the magnetron cable.

Connect the cables after fixing the magnetron.

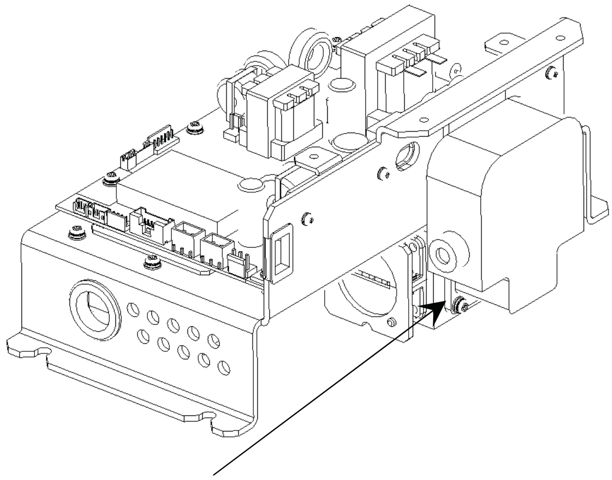
Solder the cables to the pulse transformer pins.

Pass the magnetron cable through the protection tube (reused). Pass the cable through the elongate hole of the chassis.

Connect the magnetron cables as follows:

the green cable to No. 16 of the pulse transformer and

the yellow cable to No. 15 of the pulse transformer.



After replacement, check that the magnetron is steady.

Notes:

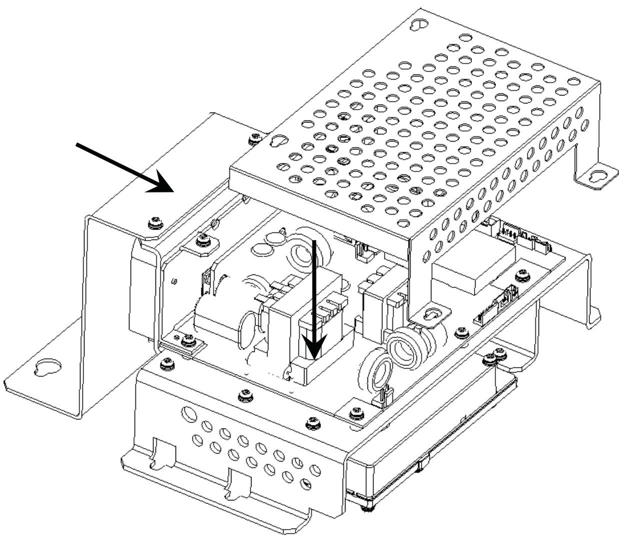
- Be careful not to connect cables faultily.
- Adjust the cables for optimal length.

  The recommended length of green cable is 175±5 mm.

  The recommended length of yellow cable is 175±5 mm.
- Touching the magnetron with metal (a tool) causes performance deterioration.

8 Set up the transceiver unit.

Attach the cover and the support plate to the transceiver unit.



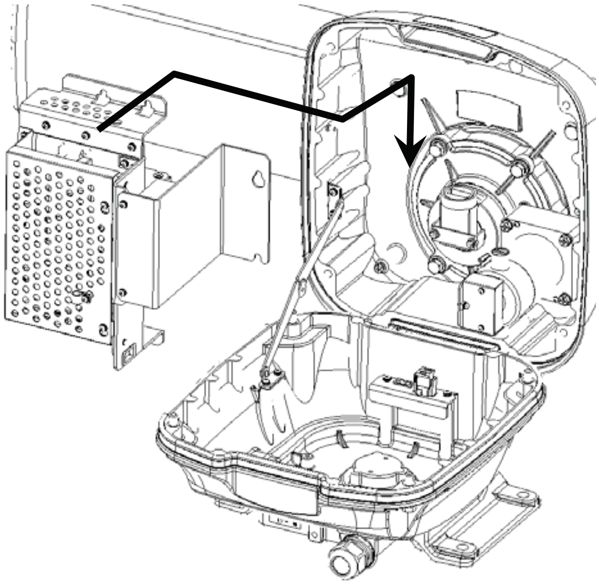
9 Install the transceiver unit.

Install the transceiver unit into the scanner unit.

When installing the transceiver unit, put the unit inside, then slide it into the joint of the wave guide tube.

Push the transceiver unit wholly so that the unit and the joint of the wave guide tube stick together.

Fix the unit with bolts with washer.

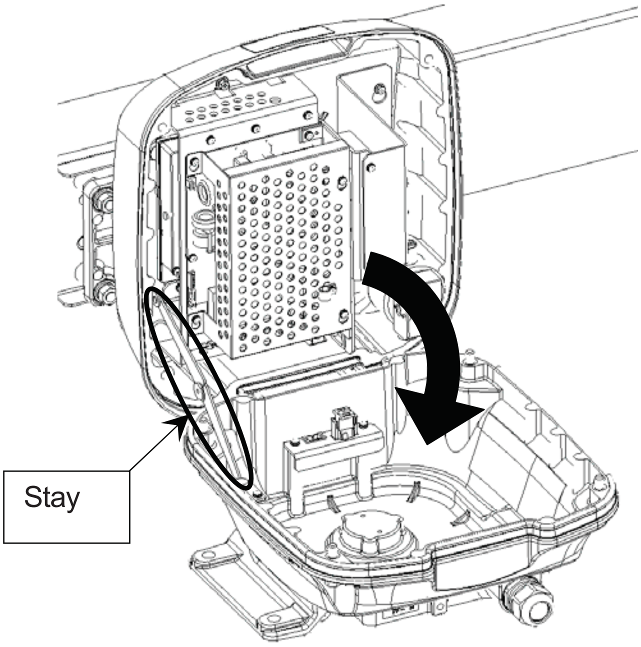


10 Close the upper housing.

Before closing the upper housing, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

Close the upper housing while pulling the center of the stay.



If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (120 to 150kgf·cm).

Notes:

- When closing the housing, be careful that the cables are not caught.
- When closing the upper housing, always pull the center of the stay. Otherwise the stay may be broken.

After the work, turn "ON" the safety switch.

This completes the magnetron replacement procedure.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

11 Turn on the radar, and allow sufficient preheating time (about 20 to 30 minutes in the STBY state).

12 Start transmission in a short pulse range, and gradually change to longer ranges. At this time, open the service engineer menu and perform provisional tuning adjustment.

If operation becomes unstable in the meantime, immediately change the equipment back into the STBY state, leave it there for 5 to 10 minutes, and restart transmission.

13 After long range transmission for about 15 minutes, open the service engineer menu again and perform tuning adjustment.

In the service engineer menu, perform adjustment for the tune indicator bar on the display to reach 80%.

In the service engineer menu, also confirm that the magnetron current indicator shows 50 to 70%.

4.5.2 Motor CBP-218

[Required tools]

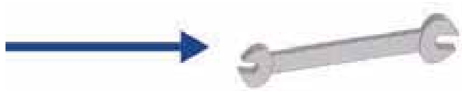
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- A single-ended wrench (width across flats 10 mm for M6 bolts)



- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1 Remove the motor unit.

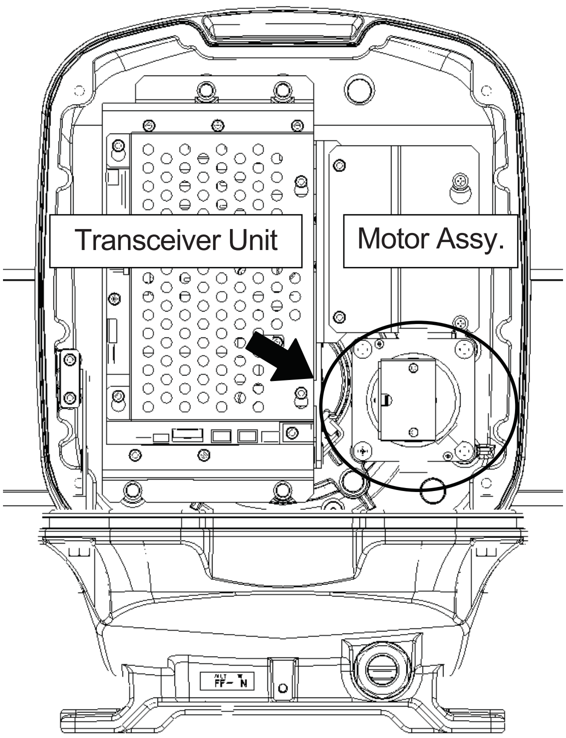
The motor unit is installed in the starboard bow side (starboard lower side when opened) of the scanner.

Remove the motor cable.

Remove the connectors of the cables connected to the transceiver unit.

The motor is fixed with 4 upset head bolts (M6X45FE) and spring washers (SW6).

Remove the bolts.

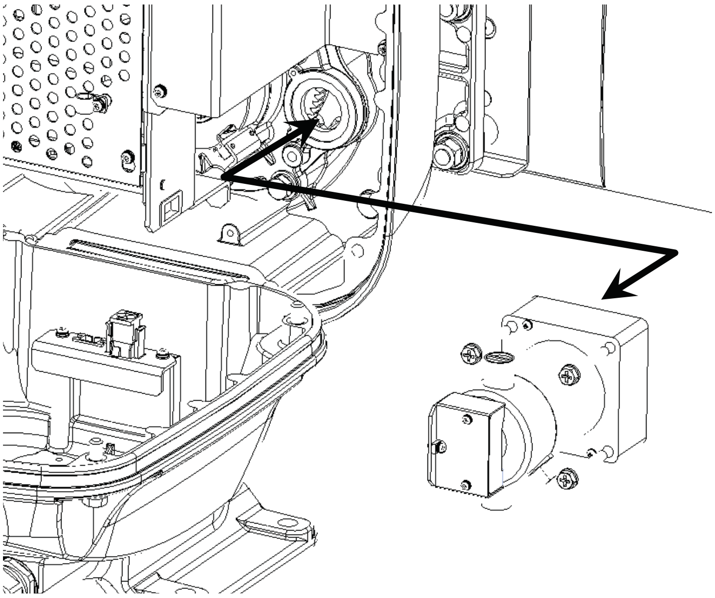


2 Replace the motor unit.

Replace the motor unit.

Apply grease to the gear when installing the motor unit.

In addition, pay attention to the gear engagement when installing.



Note:

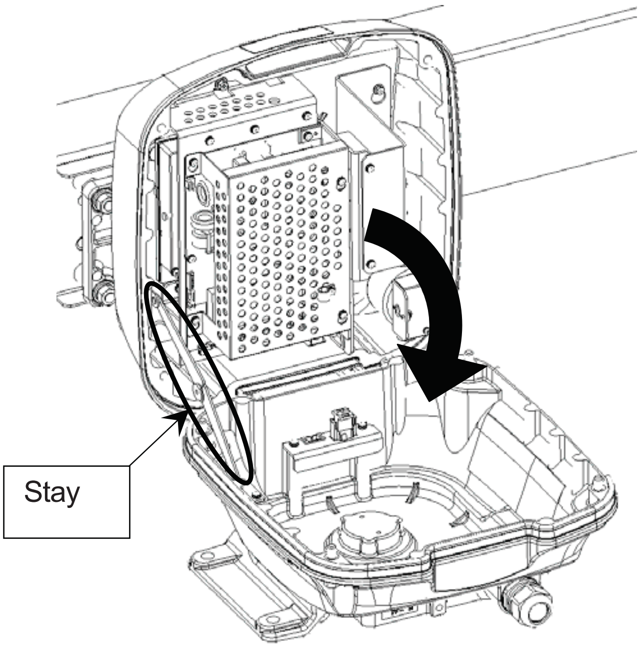
Do not forcibly install the motor. Otherwise, the gear may be damaged. If the motor cannot be installed easily, we recommend to rotate the antenna several times.

3 Close the upper housing.

Before closing the upper housing, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

Close the upper housing while pulling the center of the stay.



If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (120 to 150kgf·cm).

After the work, turn "ON" the safety switch.

Notes:

- When closing the housing, be careful that the cables are not caught.
- When closing the upper housing, always pull the center of the stay. Otherwise the stay may be broken.

This completes the motor replacement procedure.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

4 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. There shall be no abnormal noise emitted when the motor starts running, when it is running, or when it stops.

4.5.3 Compound Modulator Circuit CME-386

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1 Remove the transceiver unit.

The transceiver unit is installed in the port side of the scanner.

Remove each cable connected to the transceiver unit.

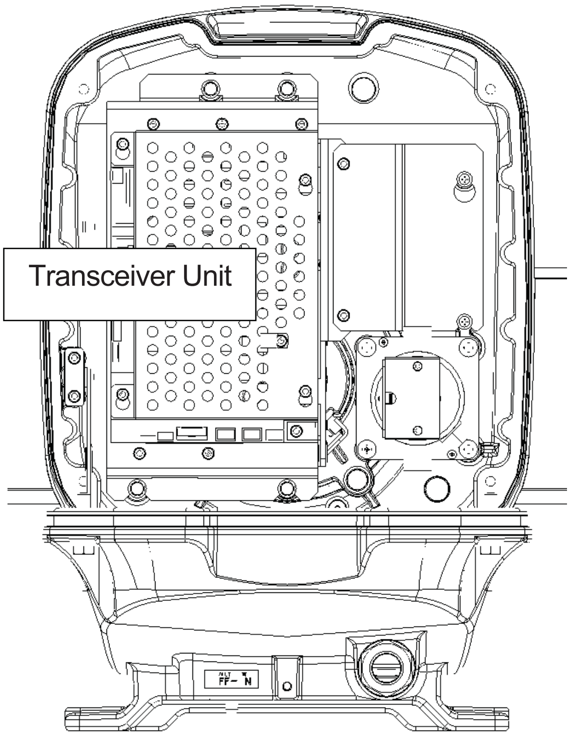
Remove the equipment cable.

Remove the motor cable.

Remove the sensor cable.

Remove the safety switch cable.

The transceiver unit is fixed with 4 upset head bolts with washer (M5X16SUS_SW_W) and 2 upset head bolts with washer (M4X10SUS_SW_W). Loosen those bolts.

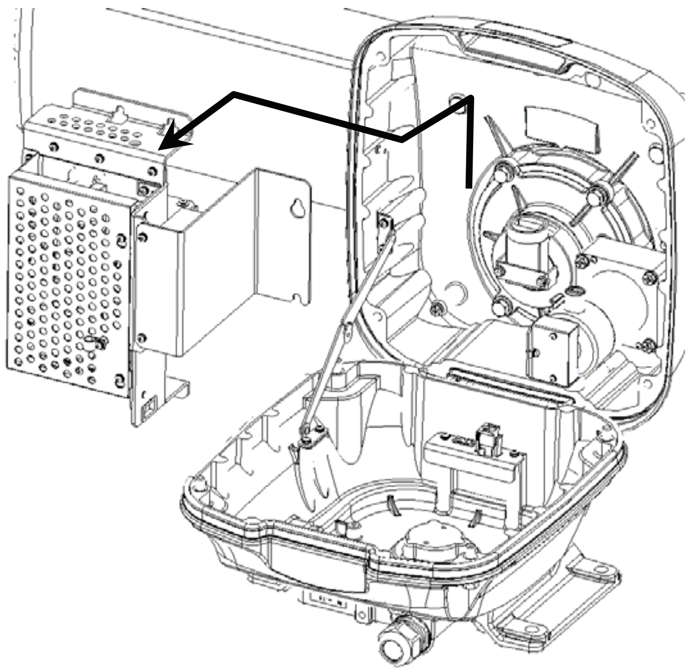


2 Remove the transceiver unit.

Remove the transceiver unit.

When removing the transceiver unit, once slide it to upper direction and pull it off.

Perform the replacement of circuits within the transceiver unit in a safe place.



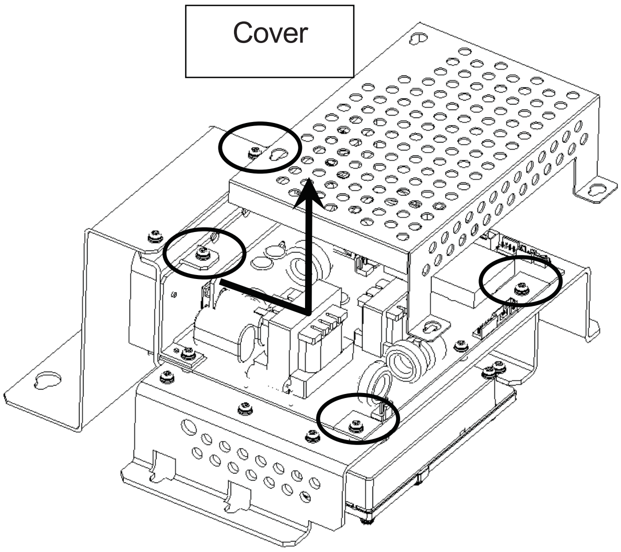
3 Remove the cover of the transceiver unit.

Perform the replacement of circuits and parts within the transceiver unit.

Remove the cover of the transceiver unit.

The cover is fixed with 4 screws with washer (M4X10Bs_SW_LW).

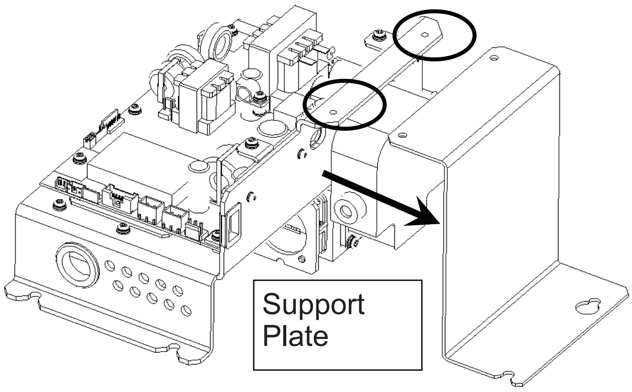
Loosen all screws and slide the cover to remove it.



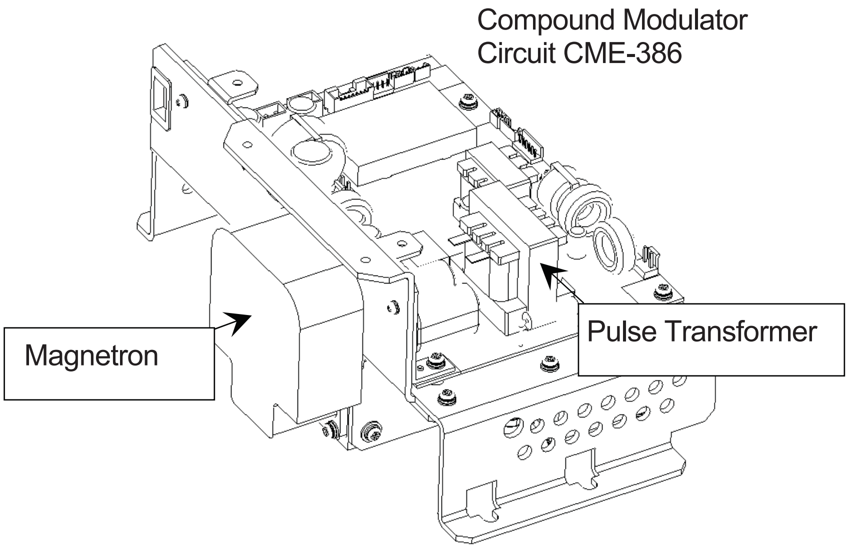
4 Remove the support plate of the transceiver unit.

The support plate is fixed with 2 screws with washer (M4X10Bs_SW_LW).

Remove all screws and slide the support plate to remove it.



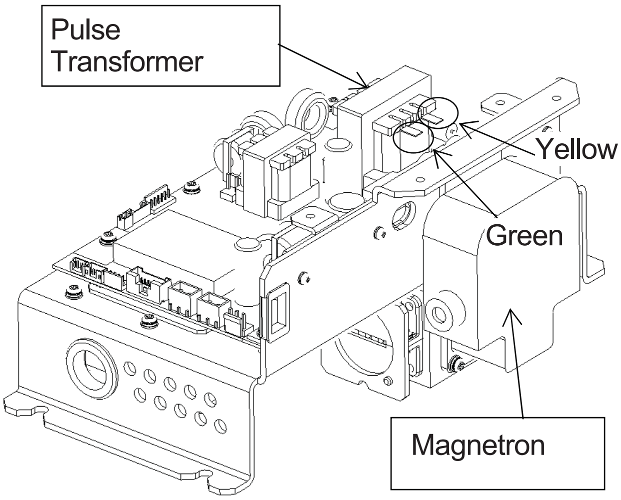
Cover and support plate removed



5 Remove the magnetron cable.

The magnetron cable is connected to the pulse transformer with two cables (green and yellow).

Remove the cables soldered to the pulse transformer pins.



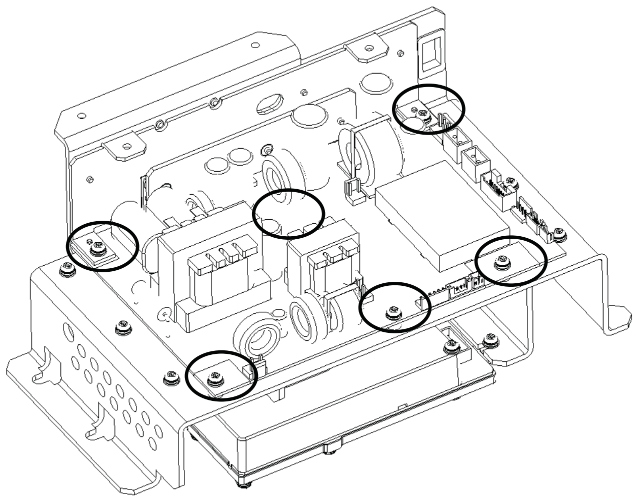
6 Replace the compound modulation circuit.

The compound modulation circuit is fixed with 9 screws; 6 screws with washer (M4X10Bs_SW_LW) and 3 screws with washer (M3X8Bs_SW_LW). Remove the screws and replace the compound modulation circuit.

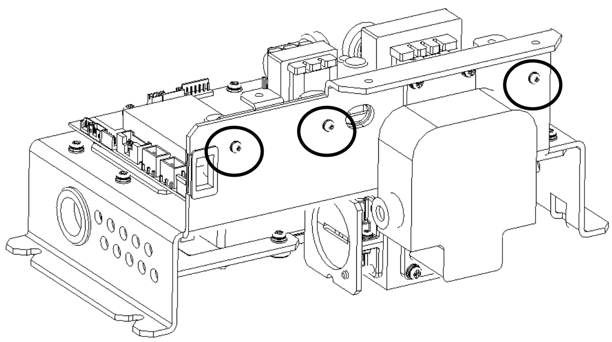
It is fixed with 6 screws on the front surface of PC plate and with 3 screws on the rear of the heat radiation plate.

*: The board is hard to be removed because of adhesion of the thermal conductivity sheet on the rear of the board. Apply force carefully and slowly to remove the board.

6 screws on the front



3 screws on the rear



7 Connect the magnetron cable.

Connect the cables after fixing the modulation circuit.

Solder the cables to the pulse transformer pins.

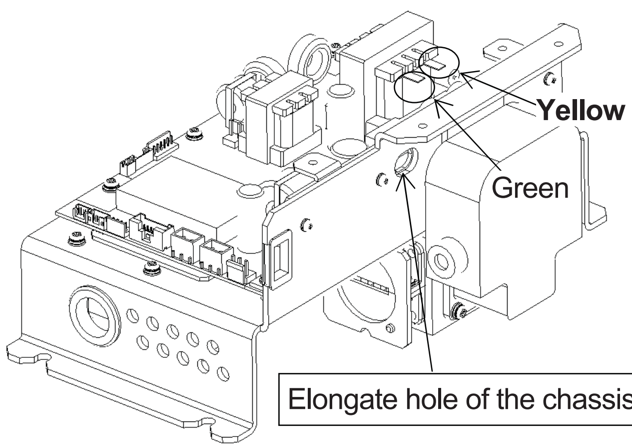
Pass the magnetron cable through the protection tube.

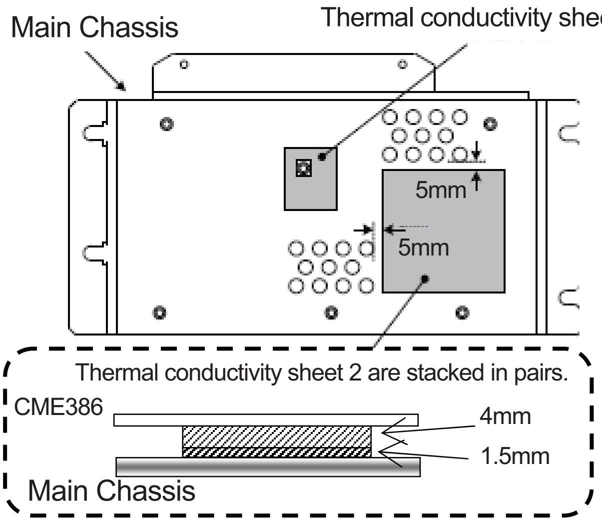
Pass the cable through the elongate hole of the chassis.

Connect the magnetron cables as follows:

the green cable to No. 16 of the pulse transformer and

the **yellow** cable to No. 15 of the pulse transformer.



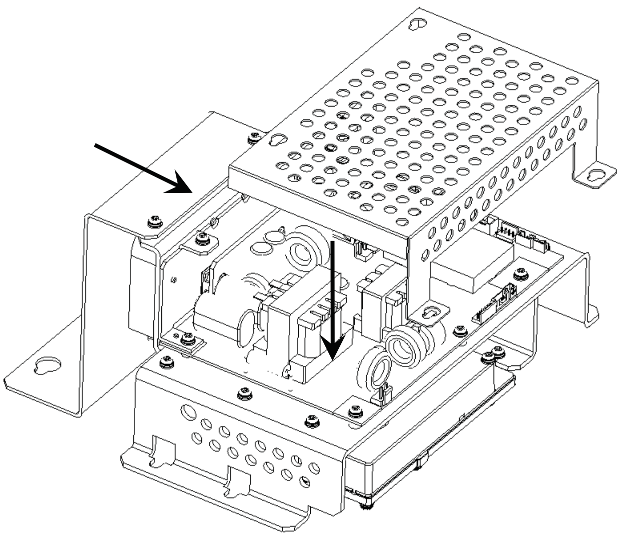


Notes:

- Be careful not to connect cables faultily.
- Use a new thermal conductivity sheet included in the circuit for maintenance.
- Touching the magnetron with metal (a tool) causes performance deterioration.

8 Set up the transceiver unit.

Attach the cover and the support plate to the transceiver unit.



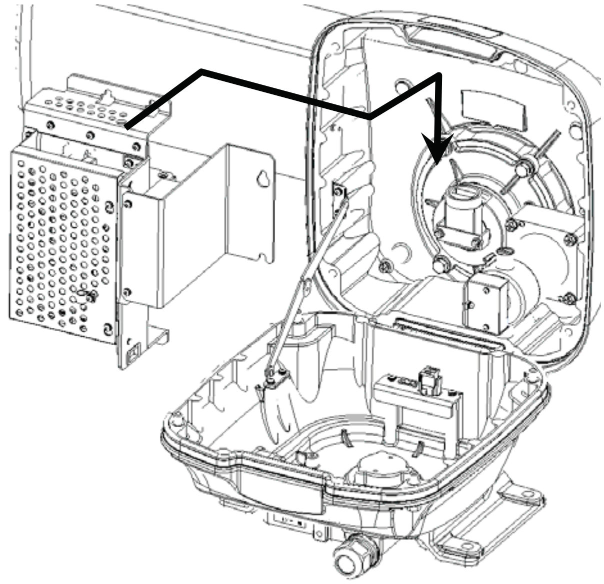
9 Install the transceiver unit.

Install the transceiver unit into the scanner unit.

When installing the transceiver unit, put the unit inside, then slide it into the joint of the wave guide tube.

Push the transceiver unit wholly so that the unit and the joint of the wave guide tube stick together.

Fix the unit with bolts with washer.

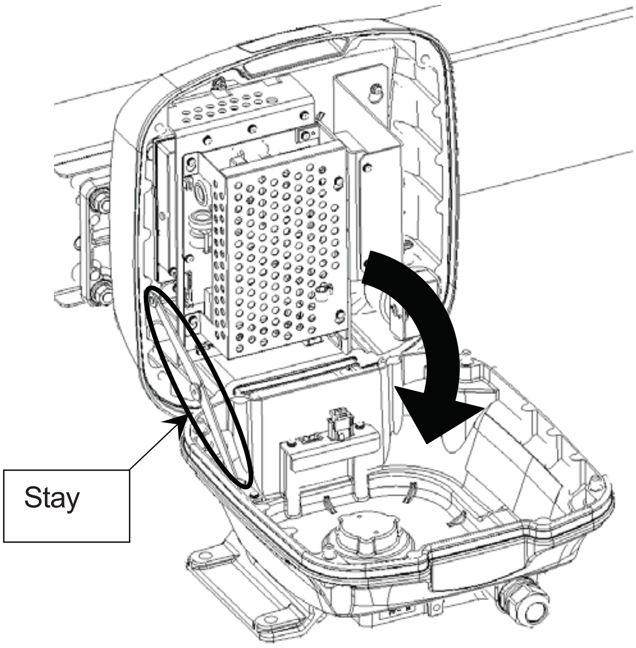


10 Close the upper housing.

Before closing the upper housing, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

Close the upper housing while pulling the center of the stay.



If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (120 to 150kgf·cm).

After the work, turn "ON" the safety switch.

Notes:

- When closing the housing, be careful that the cables are not caught.
- When closing the upper housing, always pull the center of the stay. Otherwise the stay may be broken.

This completes the compound modulation circuit replacement procedure.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

11 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

4.5.4 Receiver NRG-239

[Required tools]

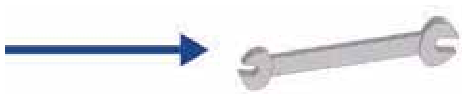
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- A single-ended wrench (Width across flats 7 mm for M4 bolts)



- Tools for removing the scanner unit covers (See Section 4.4)

[Replacement procedure]

1 Remove the transceiver unit.

The transceiver unit is installed in the port side of the the scanner.

Remove each cable connected to the transceiver unit.

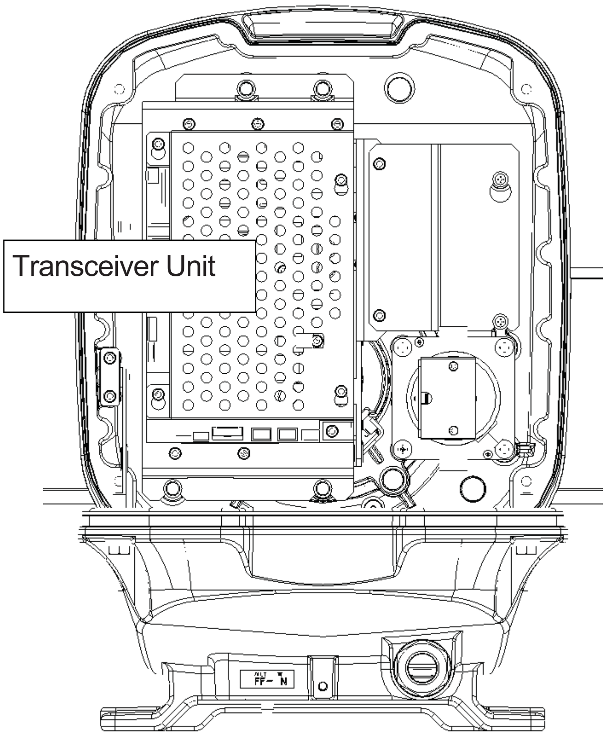
Remove the equipment cable.

Remove the motor cable.

Remove the sensor cable.

Remove the safety switch cable.

The transceiver unit is fixed with 4 upset head bolts with washer (M5X16SUS_SW_W) and 2 upset head bolts with washer (M4X10SUS_SW_W). Loosen those bolts.

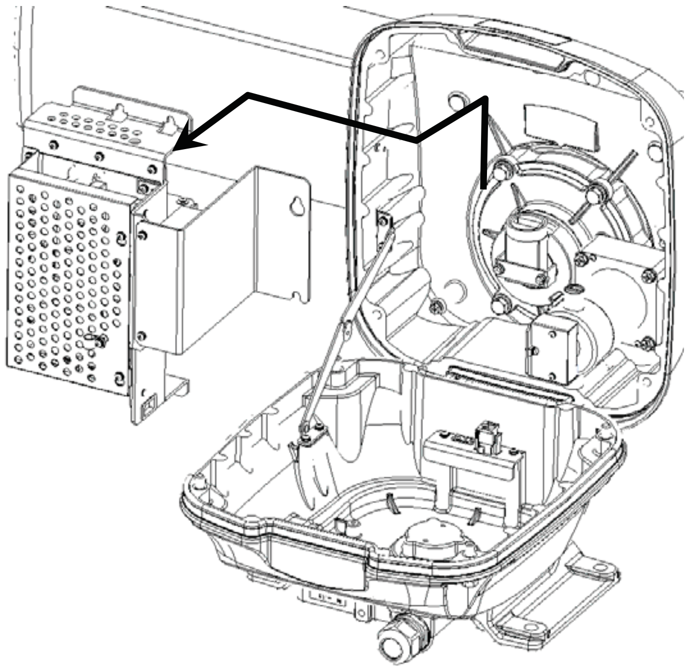


2 Remove the transceiver unit.

Remove the transceiver unit.

When removing the transceiver unit, once slide it to upper direction and pull it off.

Perform the replacement of circuits within the transceiver unit in a safe place.



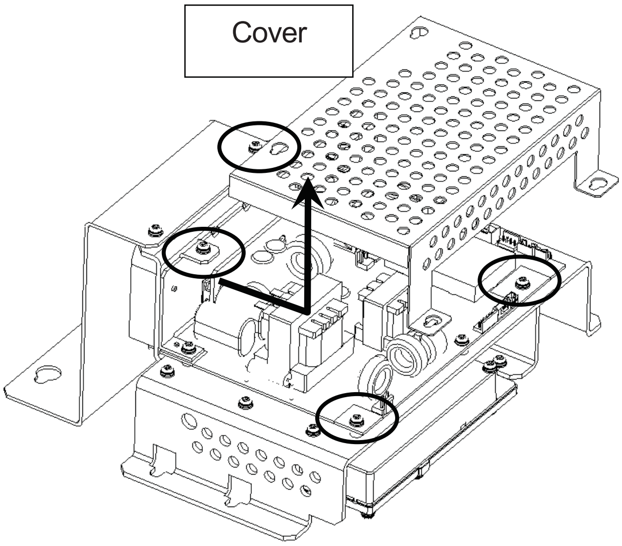
3 Remove the cover of the transceiver unit.

Perform the replacement of circuits and parts within the transceiver unit.

Remove the cover of the transceiver unit.

The cover is fixed with 4 screws with washer (M4X10Bs_SW_LW).

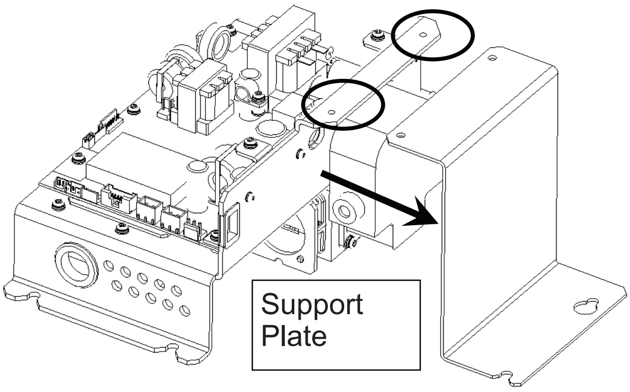
Loosen all screws and slide the cover to remove it.



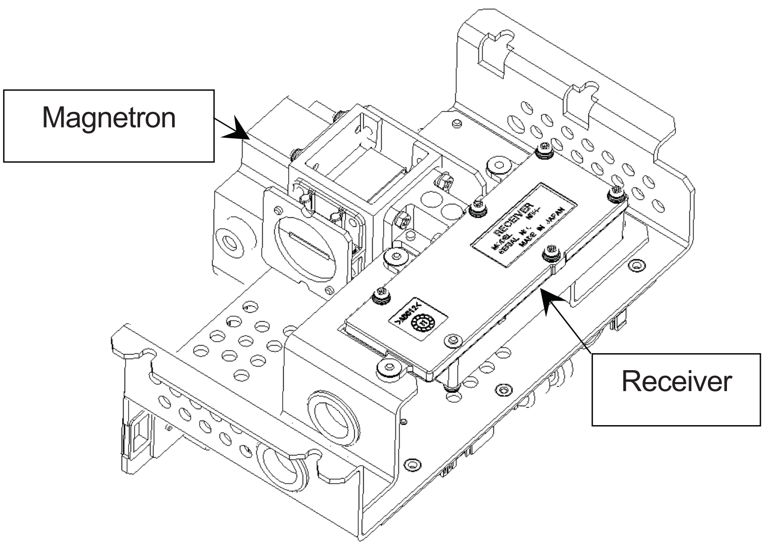
4 Remove the support plate of the transceiver unit.

The support plate is fixed with 2 screws with washer (M4X10Bs_SW_LW).

Remove all screws and slide the support plate to remove it.



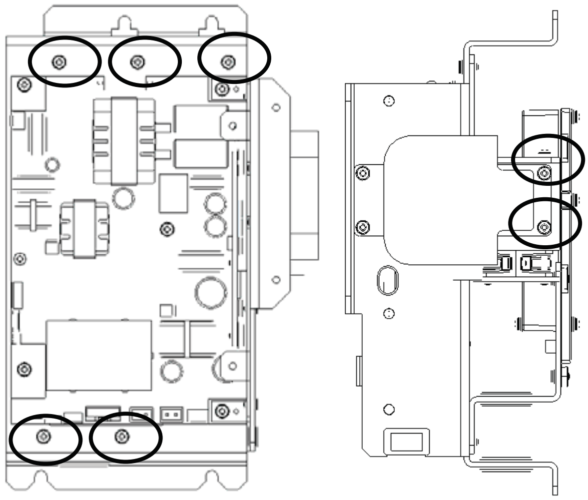
Cover and support plate removed



5 Remove the 3D circuit.

The 3D circuit is fixed with 7 screws; 5 screws with washer (M4X10Bs_SW_LW) on the main chassis and 2 screws for fixing the magnetron (M4X10Bs_SW_LW).

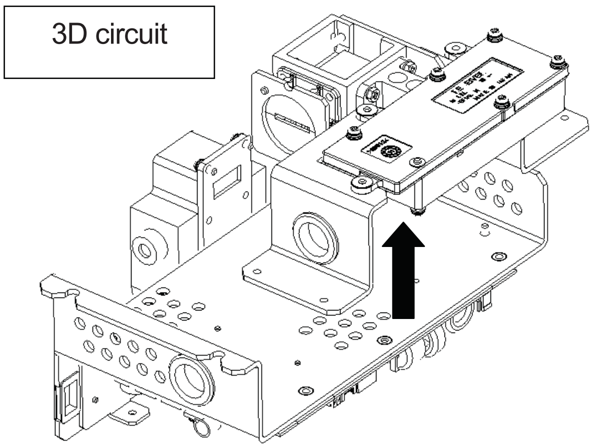
Remove the screws and remove the 3D circuit.



Note:

Use a shielded screw driver for screws for fixing the magnetron. Touching the magnetron with metal (a tool) causes performance deterioration.

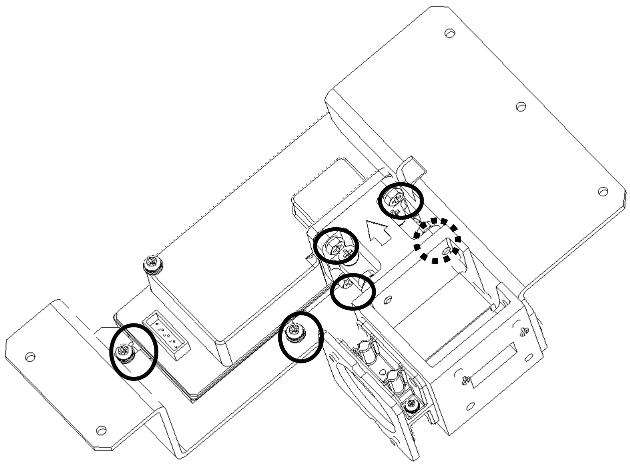
3D circuit removed



6 Remove the receiver.

The receiver is fixed with 6 screws; 2 screws with washer (M4X10Bs_SW_LW) and 4 upset head bolts with washer (M4X12SUSs_SW).

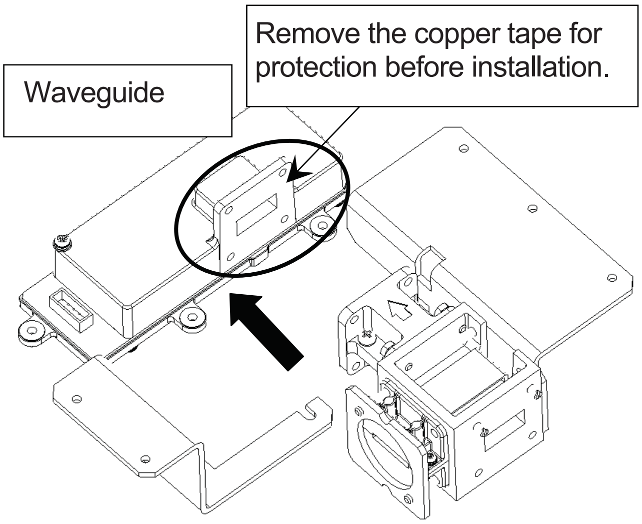
Remove the screws and remove the receiver.



7 Replace the receiver.

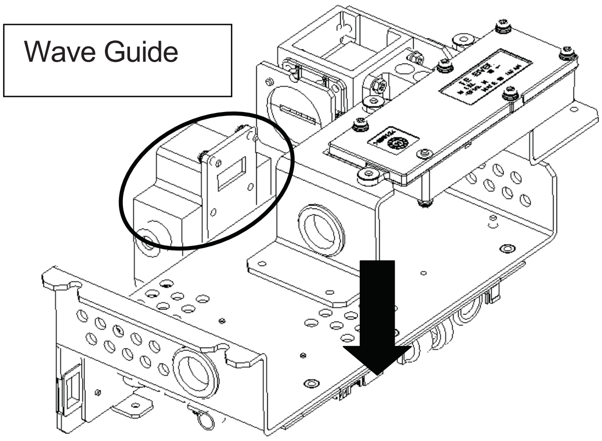
Replace the receiver.

In addition, fix the wave guide tube at first when fastening screws.



After completing the replacement of the receiver, install the 3D circuit into the main chassis.

At this time, make sure that the magnetron does not come off from or is not misaligned with the joint of the 3D circuit.

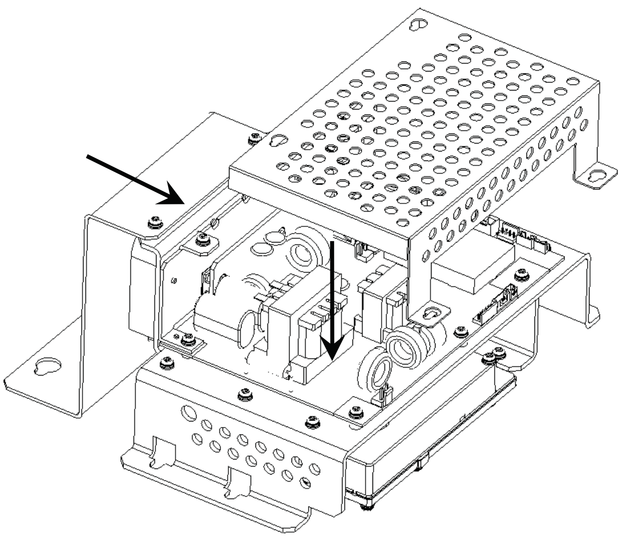


Notes:

- Before installation, remove the copper tape for protection affixed on the wave guide tube end of the receiver. This is attached to protect the receiver from being damaged by other radar waves.
- When installing the receiver, make sure that the joint does not come off or is not misaligned.

8 Set up the transceiver unit.

Attach the cover and the support plate to the transceiver unit.



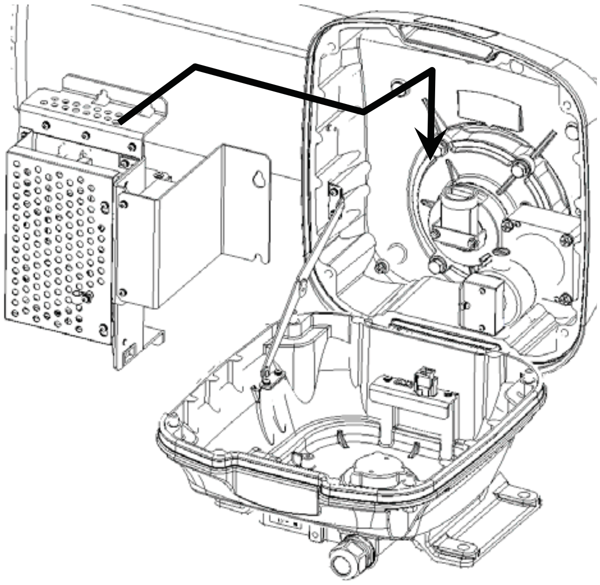
9 Install the transceiver unit.

Install the transceiver unit into the scanner unit.

When installing the transceiver unit, put the unit inside, then slide it into the joint of the wave guide tube.

Push the transceiver unit wholly so that the unit and the wave guide tube stick together.

Fix the unit with bolts with washer.

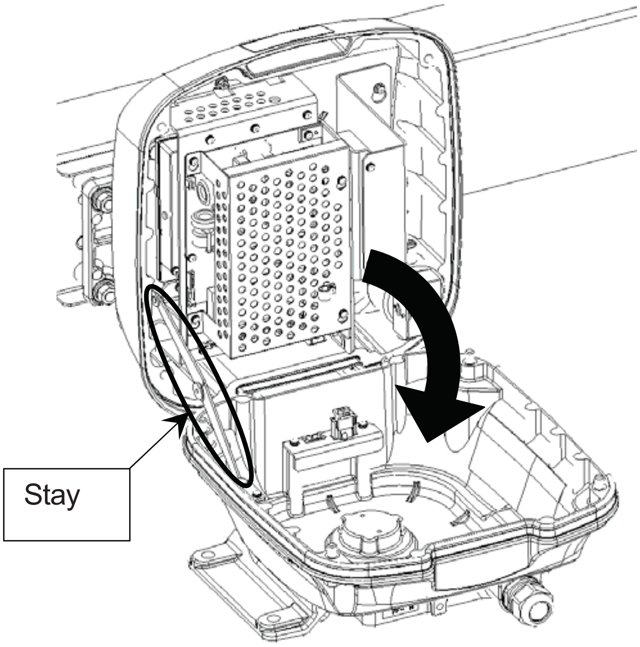


10 Close the upper housing.

Before closing the upper housing, check that the packing has no abnormality, such as deformation or cracks.

Also, remove foreign material and dust if attached.

Close the upper housing while pulling the center of the stay.



If any hexagonal bolt is not tightened enough or is loosened, the waterproof performance may be deteriorated. Be sure to tighten all bolts with specified torque (120 to 150kgf·cm).

After the work, turn "ON" the safety switch.

Notes:

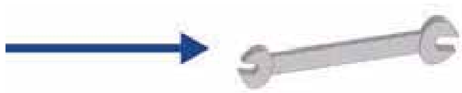
- When closing the housing, be careful that the cables are not caught.
- When closing the upper housing, always pull the center of the stay. Otherwise the stay may be broken.

This completes the receiver replacement procedure.

4.6 Parts Replacement for the Scanner Unit NKE-2103 (JMA-3340-4/6/4HS/6HS)

[Required tools]

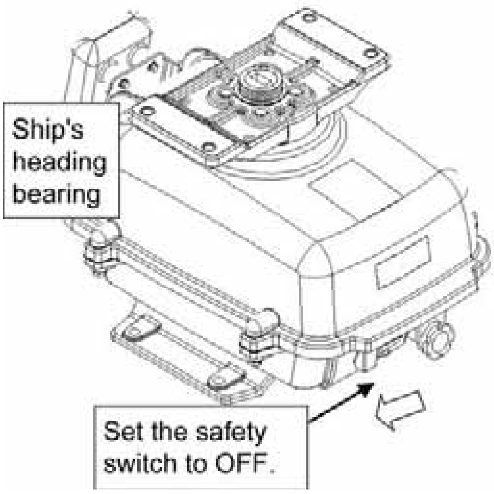
- Tools for removing the cover from the scanner unit
  A wrench (width across flats 13 mm for M8 bolts)



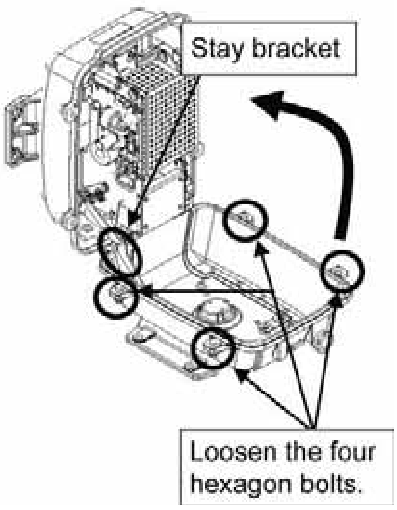
- Tools used in each part replacement procedure

[Replacement procedure]

1 Before starting the work, turn off the safety switch at the bottom of the scanner unit.



2 Loosen the four hexagon bolts, and open the top cover until the stay bracket stopper works.



Note:

Before the top cover can be closed, the stay bracket stopper must be released.

3 Replace the parts, which need replacement, according to the procedures in the subsequent sections.

Be careful not to lose screws or brackets removed during replacement.

4 After the parts replacement, close the top cover, set the safety switch to ON. (Be sure to cap the safety switch.)

The packing shall be clean, free from dust and dirt when you close the cover.

5 Turn on the radar, and perform necessary operation checks.

4.6.1 Magnetron Replacement MAF1565N

[Required tools]

- A Phillips screwdriver for 4 mm screws



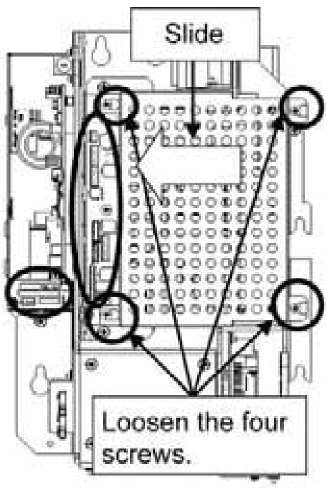
- A Phillips screwdriver for 5 mm screws



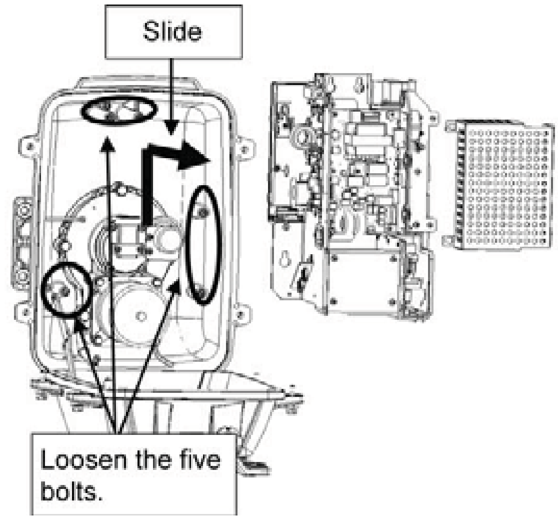
- Tools for removing the scanner unit covers (See Section 4.6)

[Replacement procedure]

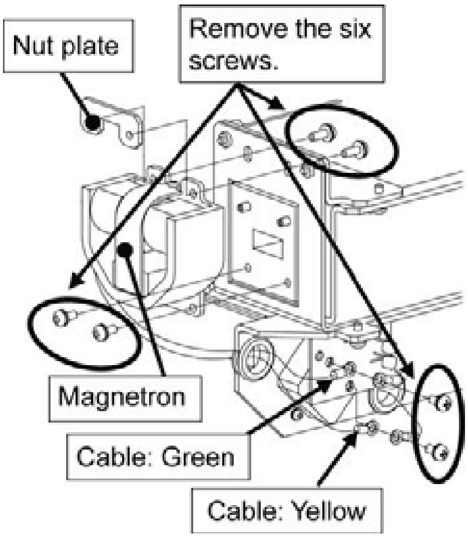
1 Open the top cover (see Section 4.6), loosen the four screws (M4), remove the transmitter-receiver unit cover, and disconnect the ten cables from the transmitter-receiver unit. The transmitter-receiver unit cover can be removed by sliding it.



2 Loosen the five bolts (M5), and remove the transmitter-receiver unit. The transmitter-receiver unit can be removed by sliding it upward.



3 Remove the six screws (M4) that secure the magnetron, and replace the magnetron.



Note:

A shielded screwdriver shall be used for magnetron replacement. Touching the magnetron with metal (a tool) causes performance deterioration.

4 Adjust the lead wires (yellow and green) of the new magnetron to an appropriate length, and tighten the screws to secure the cables.

After the magnetron replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

Note:

Be careful that the lead wires (yellow and green) of the magnetron do not touch other parts or the chassis.

Bringing the lead wires into contact with them can cause the discharge.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar, and allow sufficient preheating time (about 20 to 30 minutes in the STBY state).
2. Start transmission in a short pulse range, and gradually change to longer ranges. At this time, open the service engineer menu and perform provisional tuning adjustment.
   If operation becomes unstable in the meantime, immediately change the equipment back into the STBY state, leave it there for 5 to 10 minutes, and restart transmission.
3. After long range transmission for about 15 minutes, open the service engineer menu again and perform tuning adjustment.
   In the service engineer menu, perform adjustment for the tune indicator bar on the display to reach 80%.
   In the service engineer menu, also confirm that the magnetron current indicator shows 50 to 70%.

4.6.2 Motor H-7BDRD0048

[Required tools]

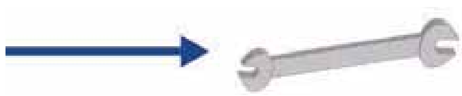
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



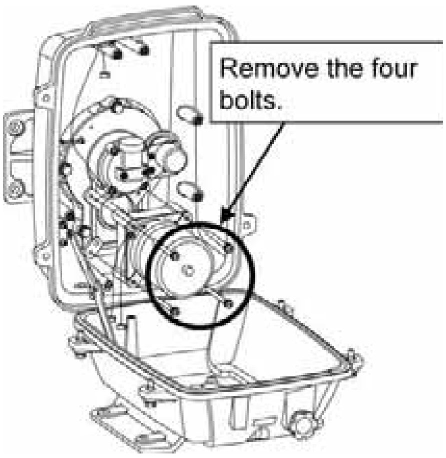
- A single-ended wrench (width across flats 10 mm for M6 bolts)



- Tools for removing the scanner unit covers (See Section 4.6)

[Replacement procedure]

1. Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1).
2. Remove the four hexagon bolts (M6), and remove the motor. Apply grease to the gear of the new motor, and install the motor in the chassis. Be sure to tighten all the four hexagon bolts with specified torque (72 kgf・cm).



3. After the motor replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

Note:

The rotor of the motor rotates, so clamp the cables not to touch the rotor.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. There shall be no abnormal noise emitted when the motor starts running, when it is running, or when it stops.

4.6.3 Motor Control Power Circuit CBD-1779

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws

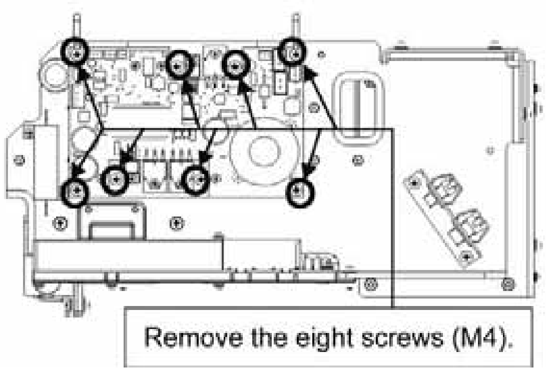


- Tools for removing the scanner unit covers (See Section 4.6)

[Replacement procedure]

1 Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1).

2 Disconnect the cables from the motor control power circuit, remove the eight screws (M4) that secure the motor control power circuit, and replace it.



3 After the replacement of motor control power circuit, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

4.6.4 Modulation Circuit CME-363

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws

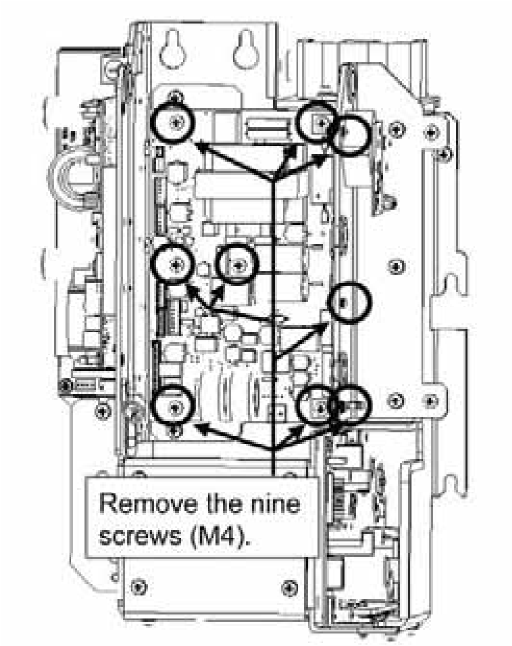


- Tools for removing the scanner unit covers (See Section 4.6)

[Replacement procedure]

1 Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1).

2 Disconnect the cables from the modulation circuit, remove the nine screws (M4) that secure the modulation circuit, and replace it.
If the heat radiation plate of the modulator is used, mount the insulating sheet straight between TR17/TR18 and the heat radiation plate.



3 After the modulation circuit replacement, carry out the work in reverse order of removal.
Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

4 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.
After long range transmission, open the service engineer menu, and confirm that the magnetron current indicator shows 50 to 70%.

4.6.5 Power Supply Circuit CBD-1783

[Required tools]

- A Phillips screwdriver for 3 mm screws



- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws

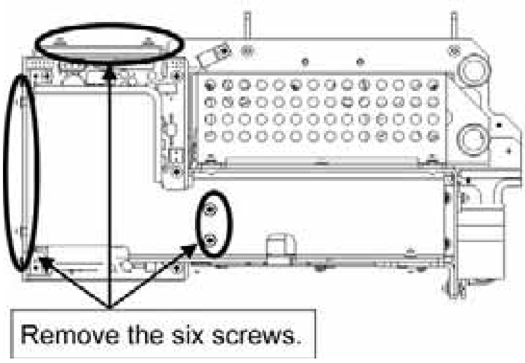


- Tools for removing the scanner unit covers (See Section 4.6)

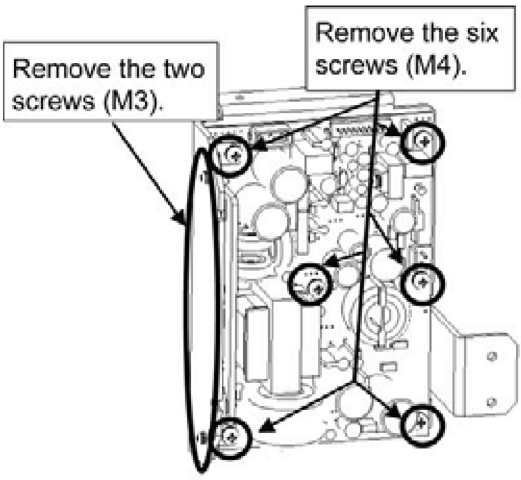
[Replacement procedure]

1 Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1).

2 Disconnect the cables and remove the six screws (M4) from the power circuit, and then remove the power supply unit from the transmitter-receiver unit.



3 Remove the six M4 screws and two M3 screws, and detach the power circuit from the mounting plate.



4 After the power circuit replacement, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.

If the square radiating sheet attached to the chassis on the back (solder side) of the power circuit is torn, change to a new one provided with the replacement power circuit.

4.6.6 Receiver NRG-610

[Required tools]

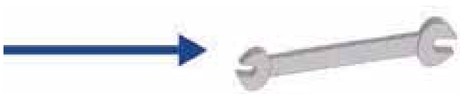
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- Single-ended wrench (width across flats 7 mm for M4 bolts)



- Tools for removing the scanner unit covers (See Section 4.6)

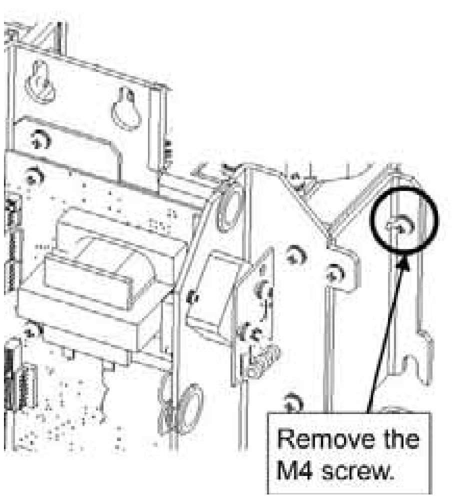
4

[Replacement procedure]

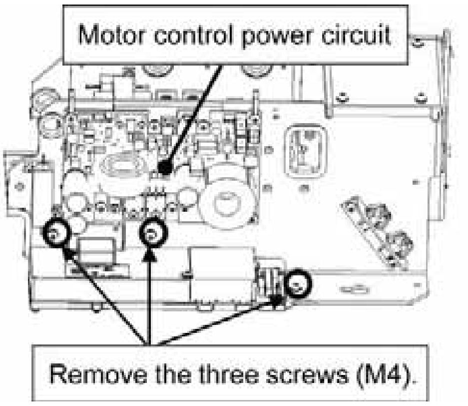
1 Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1). After that, remove the magnetron (see Section 4.6.1).

2 Remove the 3D circuit and receiver from the transmitter-receiver unit according to the procedure below.

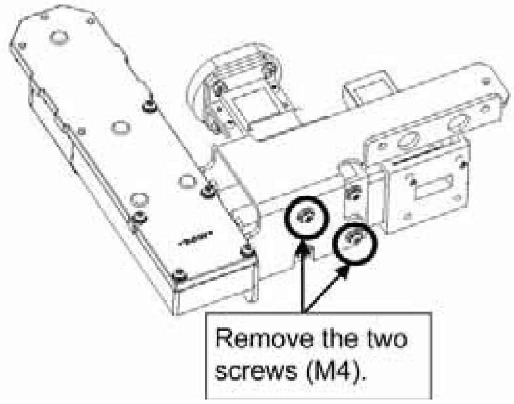
f) Remove the M4 screw near the magnetron.



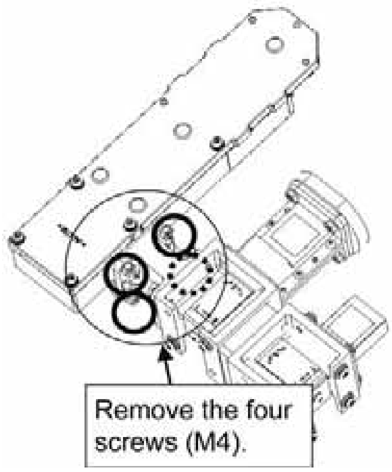
g) Remove the three screws (M4) from the motor control power circuit, and remove the 3D circuit from the chassis.



h) Remove the two screws (M4) that secure the 3D circuit, and detach the 3D circuit from the mounting plate.



i) Remove the four screws (M4) that secure the receiver, and replace it.



3 **After the receiver replacement, carry out the work in reverse order of removal.**

Be sure to tighten all the bolts and screws and connect all the cables.

Note:

After receiver replacement, perform the assembly procedure, paying attention to the fitting of the transmitter-receiver unit. If the fitting is poor, loosen the screws and perform the adjustment again.

4.6.7 Encoder CHT-71A

[Required tools]

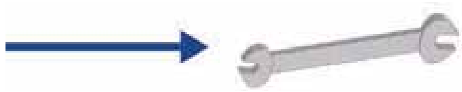
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



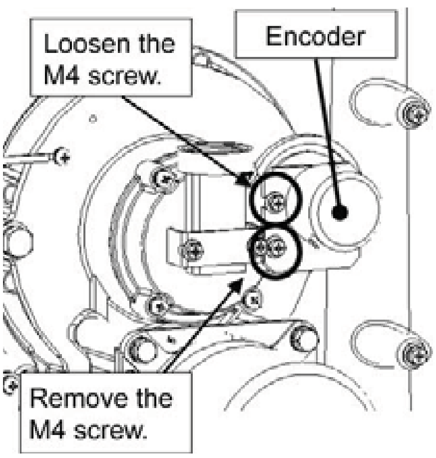
- Single-ended wrench (width across flats 7 mm for M4 bolts)



- Tools for removing the scanner unit covers (See Section 4.6)

[Replacement procedure]

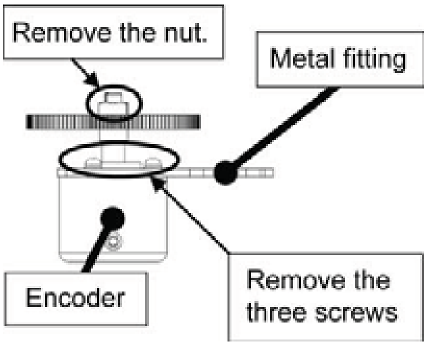
1. Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1).
2. Remove the two screws (M4) that secure the encoder, and remove the encoder from the chassis.



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3 Remove the metal fitting and gear wheel from the old encoder, mount them on the new encoder, and install the encoder in the chassis.



4 After the encoder replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. At this time, open the service engineer menu and adjust the bearing.

4.6.8 Brake Circuit CFA-252

[Required tools]

- A Phillips screwdriver for 3 mm screws



- A Phillips screwdriver for 4 mm screws



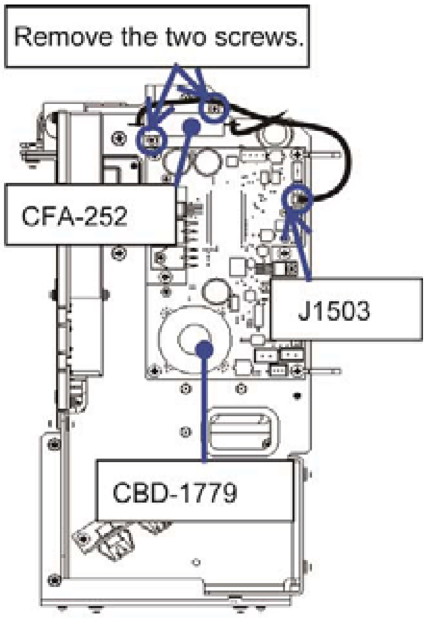
- A Phillips screwdriver for 5 mm screws



- Tools for removing the scanner unit covers (See Section 4.6)

[Replacement procedure]

1. Open the top cover (see Section 4.6), and remove the transmitter-receiver unit (see Section 4.6.1).
2. Disconnect the cables that are connected to J1503 of the motor control power circuit (CBD-1779).



3. Remove the two screws (M3) that secure the resistor, and replace the brake circuit (CFA-257, resistor with cable).
4. After the brake circuit replacement, carry out the work in reverse order of removal.

Note:

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

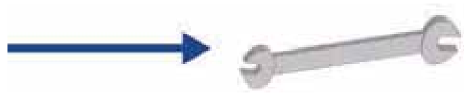
After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

4.7 Parts Replacement for the Scanner Unit NKE-2254 (JMA-3355-7/9)

[Required tools]

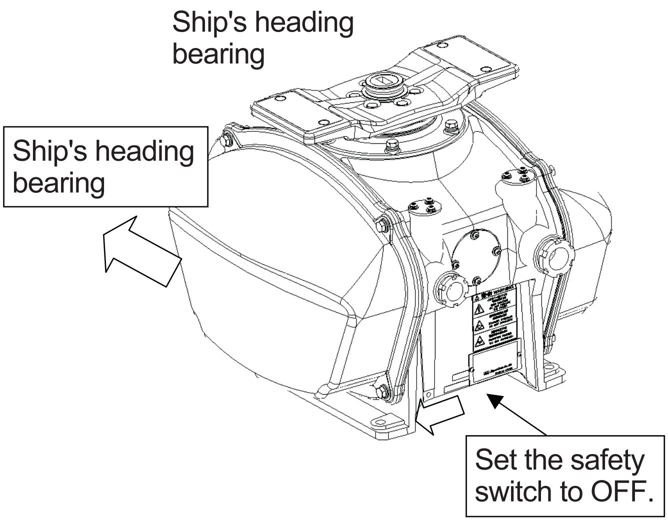
- Tools for removing the cover from the scanner unit
  A wrench (width across flats 13 mm for M8 bolts)



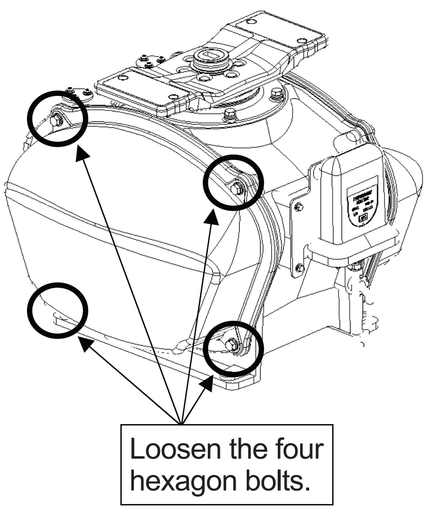
- Tools used in each part replacement procedure

[Replacement procedure]

6 Before starting the work, turn off the safety switch at the bottom of the scanner unit.



7 Loosen the four hexagon bolts, and remove the pedestal cover.



To replace the following parts, remove the cover from the left (port) side:

- Motor
- Motor driver circuit

To replace the following parts, remove the cover from the right (starboard) side:

- Transmitter (magnetron, modulation circuit, or fan for the modulation circuit)
- Receiver
- T/R control circuit
- Power supply circuit
- Encoder

8 Replace the parts, which need replacement, according to the procedures in the subsequent sections.

Be careful not to lose screws or brackets removed during replacement.

9 After the parts replacement, mount the pedestal cover, set the safety switch to ON. (Be sure to cap the safety switch.)

The packing shall be clean, free from dust and dirt when you mount the cover.

10 Turn on the radar, and perform necessary operation checks.

4.7.1 Magnetron M1568BS

[Required tools]

- A Phillips screwdriver for 4 mm screws



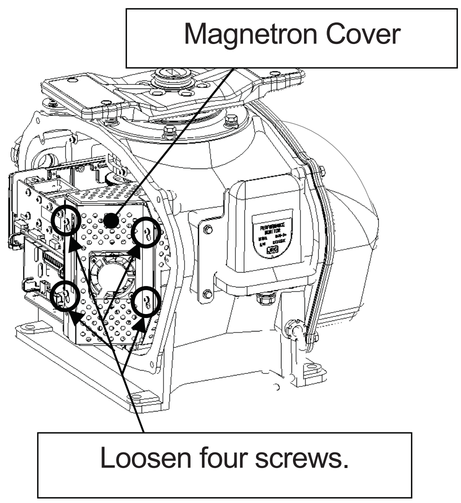
- A Phillips screwdriver for 5 mm screws



- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

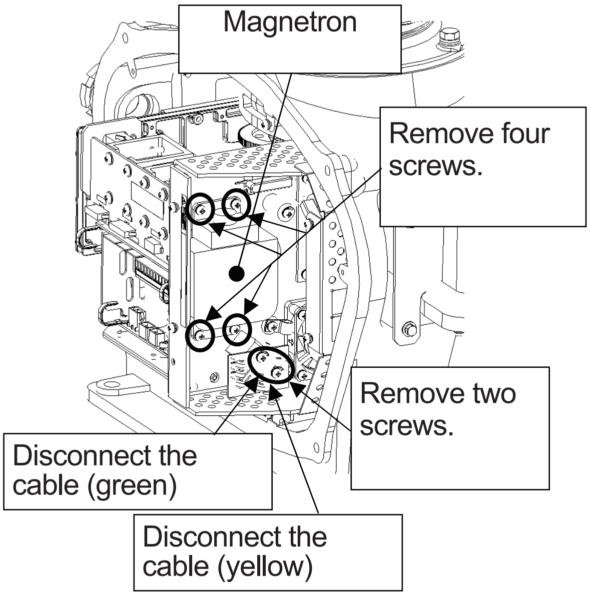
1 Remove the covers from the right (starboard) side (see Section 4.7) and loosen the screws (four M4 screws) to remove the magnetron cover.



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2 Make sure there is no charge remaining in the modulation high-voltage circuit board, and then remove the screws (two M4 screws) holding the magnetron cables (yellow and green) in place.



3 Remove the screws (four M4 screws) holding the magnetron in place, then replace the magnetron after cutting the leads (yellow and green) for the replacement magnetron to an appropriate length.

Note:

Use a shielded secrewdriver because the contact of the metal tool with the magnetron causes deterioration of its performance.

4 After having replaced the magnetron, reassemble the unit by following the disassembly procedure in the reverse order.

Be sure to tighten all the bolts and screws and connect all the cables.

Note:

Extreme care should be taken to connect the leads (yellow and green) to the magnetron for prevention of contact with other parts or the casing. Contact may cause them to discharge.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar and allow sufficient preheating time (20 - 30 minutes in the STBY mode).

2 Start transmission in a short pulse range, and gradually change to longer ranges. Open the service engineer menu and provisionally adjust the tuning.

Whenever operation becomes unstable, immediately return to STBY, wait five to ten minutes, and then transmit again.

3 After long range transmission for about 15 minutes, open the service engineer menu again and perform tuning adjustment.

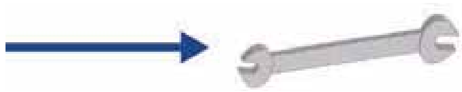
Perform the adjustment in the service engineer menu until the tuning display bar on the display unit reaches the eighth calibration mark.

With the service engineer menu open, also make sure the magnetron current is shown between the fifth and seventh calibration markings.

4.7.2 Motor CBP-168A, CBP-182

[Required tools]

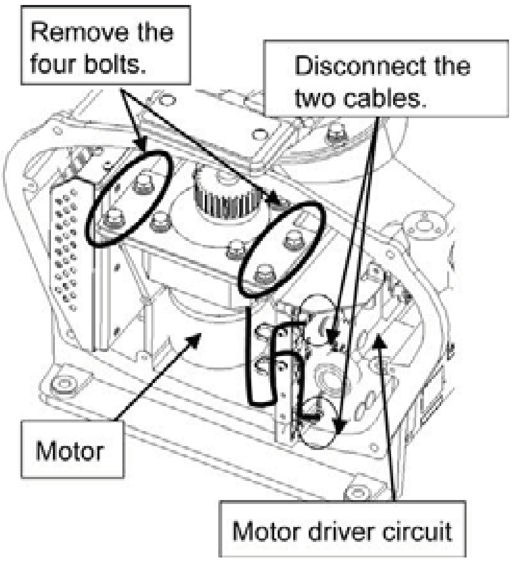
- A single-ended wrench (width across flats 17 mm for M8 bolts)



- Tools for removing the scanner unit covers (See Section 4.7)

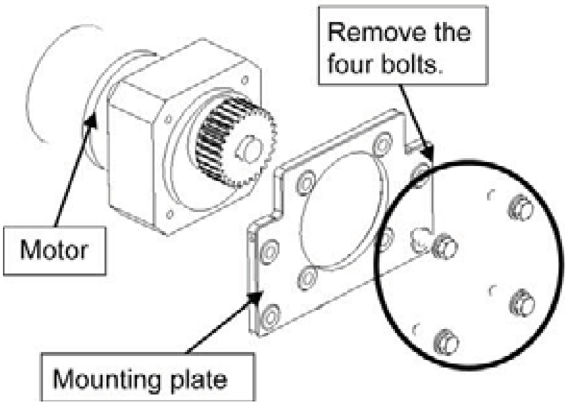
[Replacement procedure]

1 Remove the cover from the left (port) side (see Section 4.7), and disconnect the cables that are connected to the motor driver circuit from the motor.



2 Remove the four hexagon bolts (M8), and remove the motor.

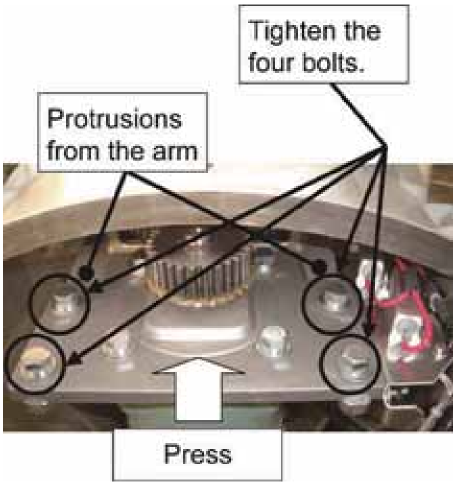
3 Remove the four hexagon bolts (M8), and detach the mounting plate from the motor.



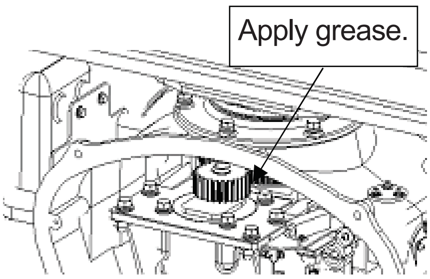
4 Attach the mounting plate to the new motor. Be sure to tighten all the four hexagon bolts with specified torque (210 kgf・cm).

5 Install the motor in the scanner unit. Press the motor against the protrusions on the arms extending from the chassis, and secure the motor after adjustment to minimize motor backlash.

Be sure to tighten all the four hexagon bolts with specified torque (140 kgf・cm).



6 Apply grease to the gear after installing the motor.



7 After the motor replacement, carry out the work in reverse order of removal.

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. There shall be no abnormal noise emitted when the motor starts running, when it is running, or when it stops.

4.7.3 Motor Control Power Circuit CBD-1779

[Required tools]

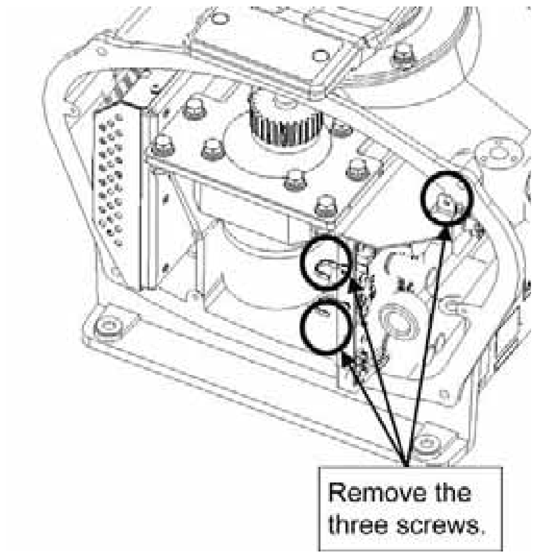
- A Phillips screwdriver for 4 mm screws



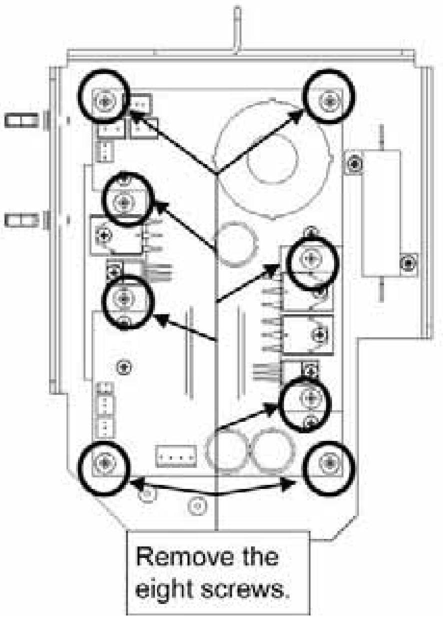
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

1 Remove the cover from the left (port) side (see Section 4.7), disconnect the cables and remove the three screws (M4) from the motor driver circuit, and then detach the plate on which the motor driver circuit is mounted.



2 Disconnect the cables from the motor driver circuit, remove the four screws (M4), and replace the motor driver circuit.



3 After the driver circuit replacement, carry out the work in reverse order of removal. Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally. There shall be no abnormal noise emitted when the motor starts running, when it is running, or when it stops.

4.7.4 Modulation Circuit CPA-264

[Required tools]

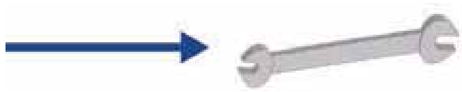
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



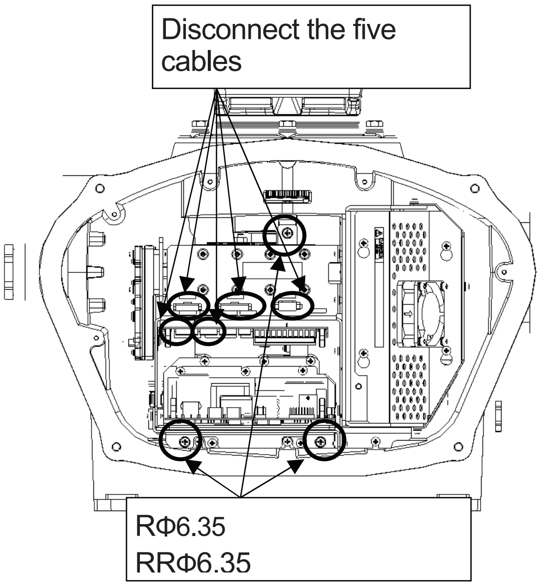
- Single-ended wrench (width across flats 7 mm for M4 bolts)



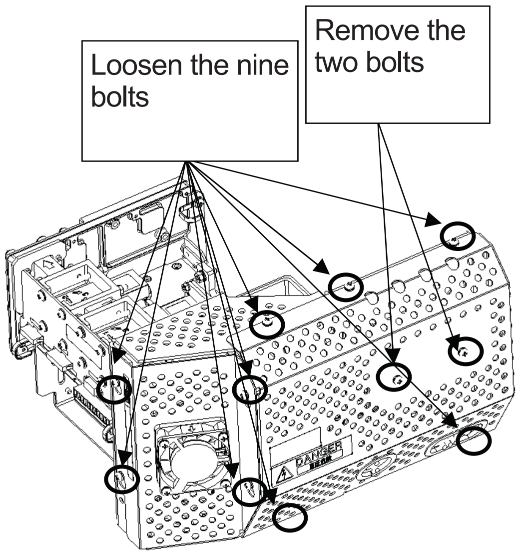
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

1. Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.



2. Loosen the screws (nine M4 screws) holding the cover in place, remove the screws (two M4 screws) holding the heat radiation plate in place, and remove the cover.

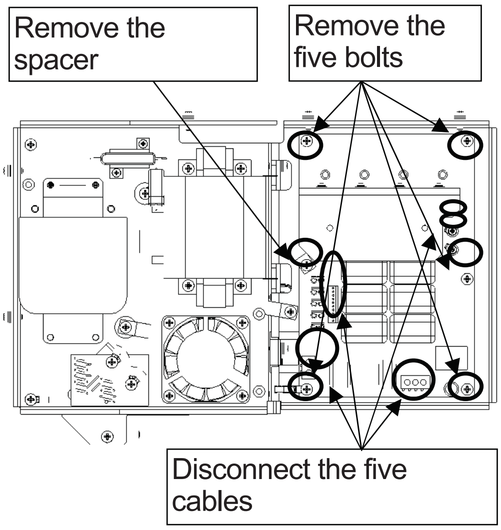


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3. Remove the cables connected to the modulator circuit board, then remove the screws (five M4 screws) holding the modulator circuit board in place and the spacer (one 7 mm (nominal) spacer), and replace the modulator circuit board.

   If reusing the heat radiation plate on the modulator, be sure to install the thermal insulation sheet between the TR5-8 and the heat radiation plate so that it is straight.



4. After having replaced the modulator circuit board, reassemble the unit following the disassembly procedure in the reverse order.

   Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar and emit radar waves once the countdown is finished, and check that the radar image is correctly displayed.

   Transmit radar signals on a long range and with the service engineer menu open, also make sure the magnetron current is shown between the fifth and seventh calibration markings.

4.7.5 Modulator NMA-550-1

[Required tools]

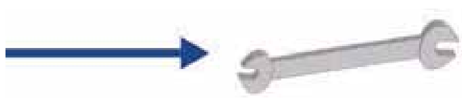
- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



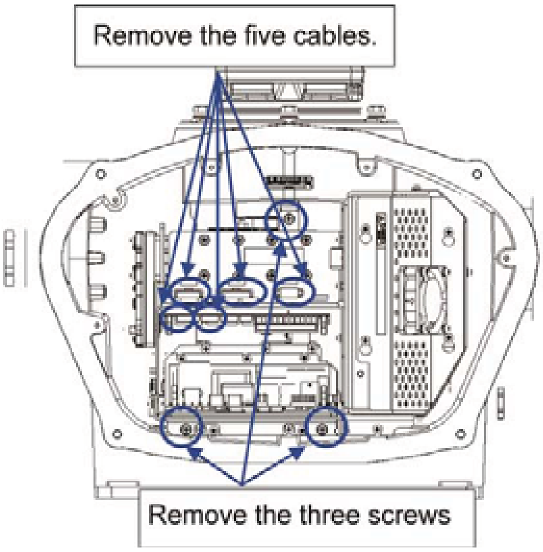
- A wrench (width across flats 7 mm for M4 bolts)



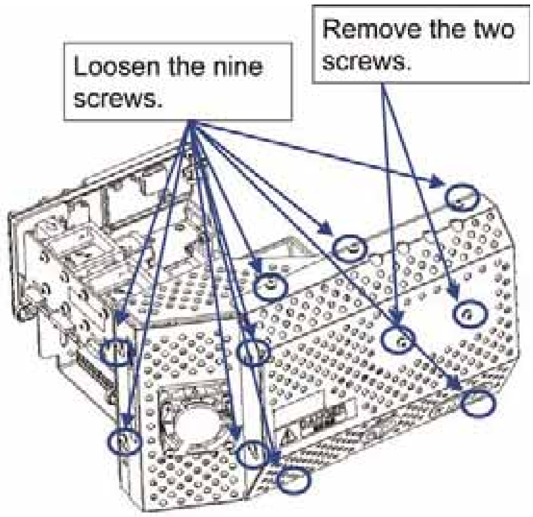
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

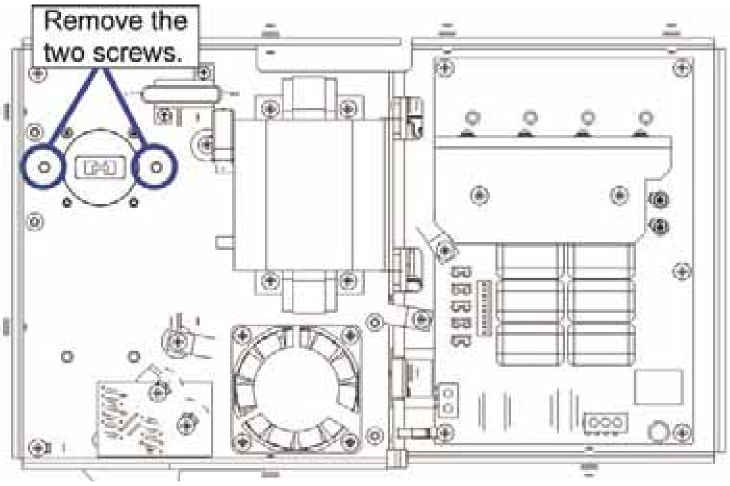
1. Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit, and remove the transmitter-receiver unit.



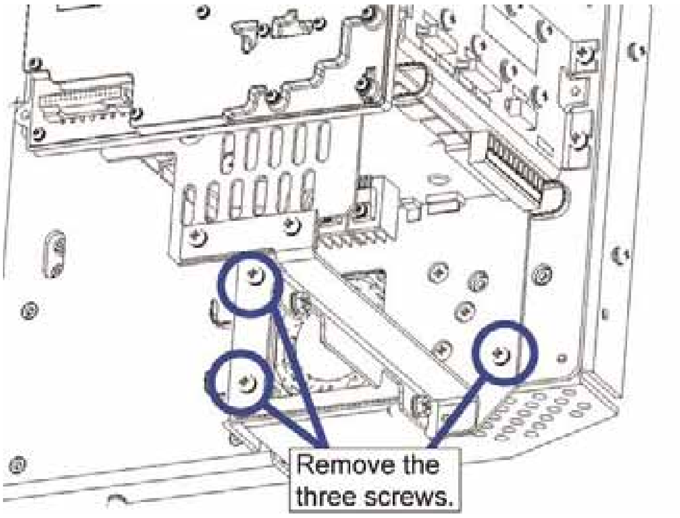
2. Loosen the screws (nine M4 screws) holding the cover, remove the screws (two M4 screws) holding the heat radiation plate, and remove the cover.
3. See Section 4.7.1 to remove the magnetron.

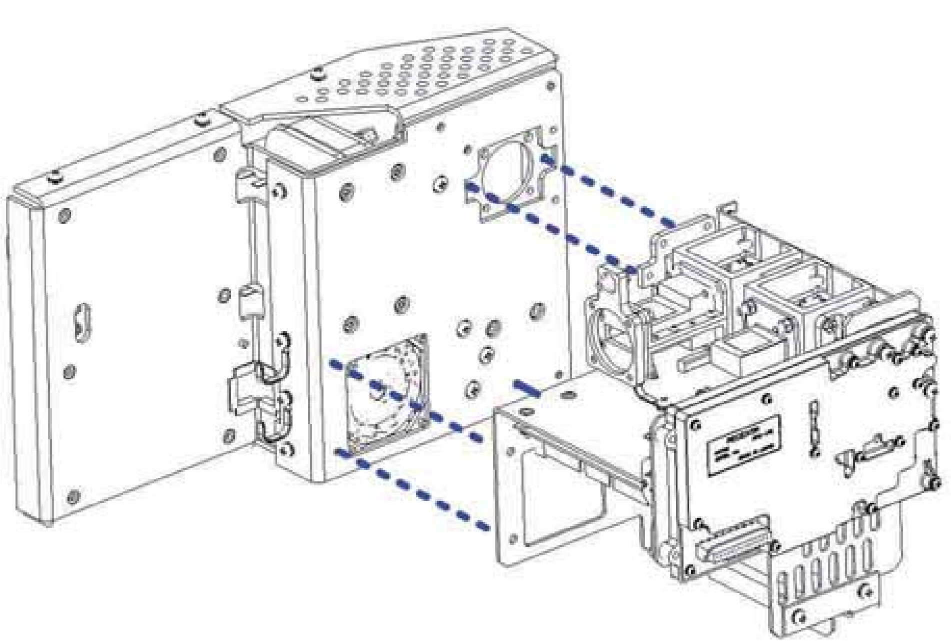


4 Remove the two M4 screws holding the connecting wave guide.

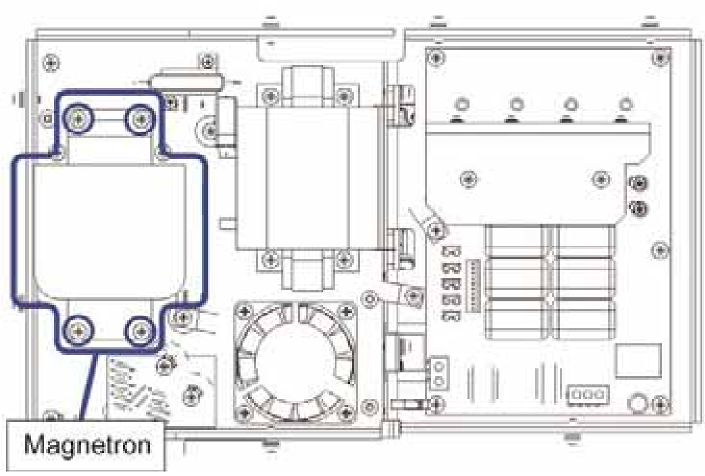


5 Remove the three M4 screws at the rear of the modulator.





6 Mount the magnetron you have removed in step ***3*** of Replacement procedure on new modulator (see Section 4.7.1).



7 Carry out the work in reverse order of removal.

Note:

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

After long range (48NM) transmission, open the service engineer menu, and confirm that the magnetron current indicator shows 60 to 90% (see Section 6.1).

4.7.6 Power Supply Circuit CBD-1682A

[Required tools]

- A Phillips screwdriver for 4 mm screws



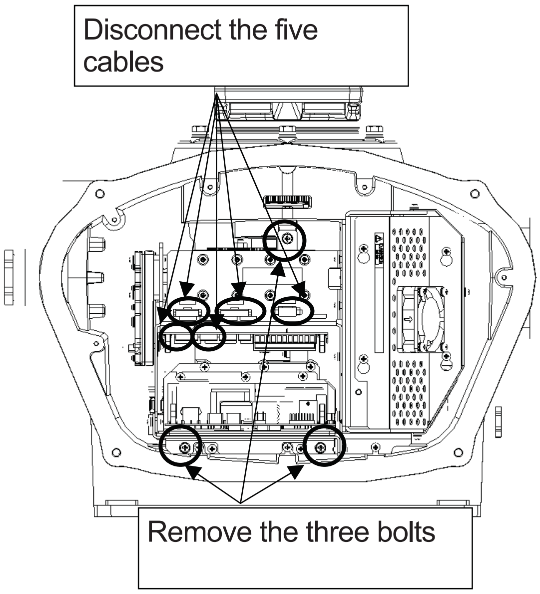
- A Phillips screwdriver for 5 mm screws



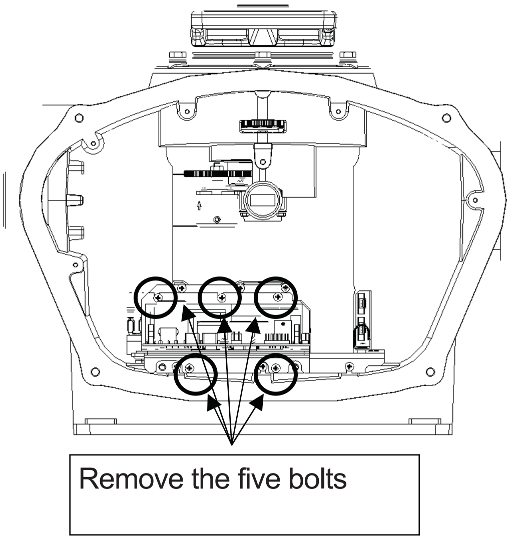
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

1 Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.

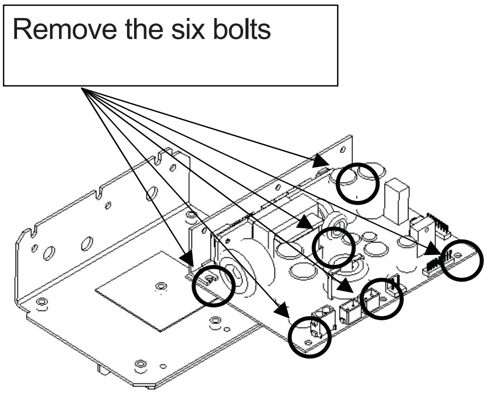


2 Remove the cables connected to the power supply circuit board and the screws (five M4 screws) holding the power supply circuit board in place. Remove the power supply circuit board together with the metal fitting holding the power supply circuit board in place.



3 Remove the screws (six M4 screws) holding the power supply circuit board in place and replace the power supply circuit board.

If the square heat radiation sheet on the casing on the back of the power supply circuit board (the soldered side) is damaged, affix a new sheet to the replacement power supply circuit board.



4 After having replaced the power supply circuit board, reassemble the unit following the disassembly procedure in the reverse order.

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar and emit radar waves once the countdown is finished, and check that the radar image is correctly displayed.

4.7.7 T/R Control Circuit CMC-1205R

[Required tools]

- A Phillips screwdriver for 4 mm screws



- A Phillips screwdriver for 5 mm screws



- Tools for removing the scanner unit covers (See Section 4.7)

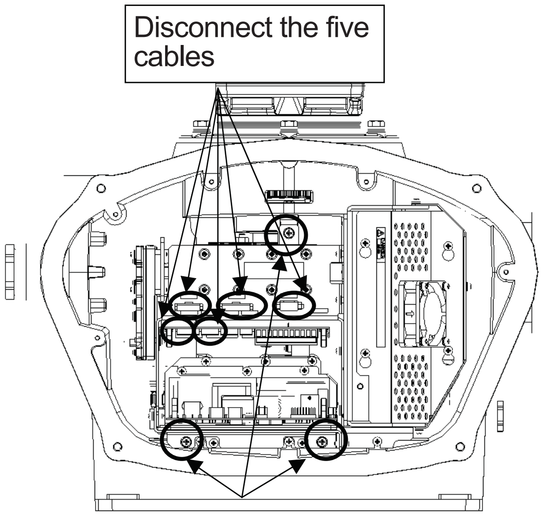
[Replacement procedure]

1 Before beginning the replacement procedure, open the service engineer menu of the radar display unit and back up the scanner unit data (transmission time and motor rotation time).

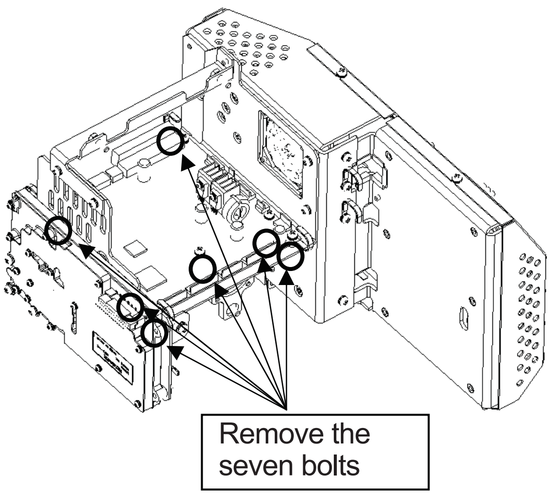
Note:

If you do not back up this data, it will not be possible to maintain continuity in scanner data such as the magnetron usage time.

2 Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.



3 Remove the cables connected to the T/R control circuit board and the screws (seven M4 screws) and replace the T/R control circuit board.



Note:

Set the DIP switch and jumper pins of the T/R control circuit board to suite the NKE-2254 (see Section 2.5.4).

4 After having replaced the T/R control circuit board, reassemble the unit following the disassembly procedure in the reverse order.
Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar, open the service engineer menu, restore the scanner unit times, and make sure that the data has been correctly continued before/after the T/R control circuit board replacement (check the transmission time and the motor rotation time).

2 Begin transmission once the countdown is complete and check that the radar image is correctly displayed.

4.7.8 Receiver NRG-162A

[Required tools]

- A Phillips screwdriver for 4 mm screws



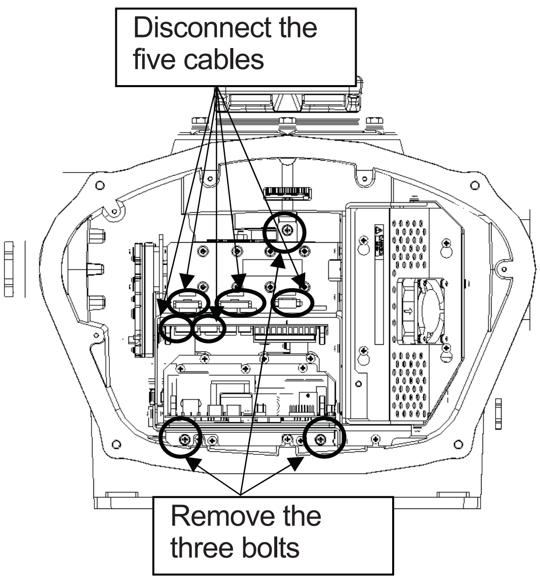
- A Phillips screwdriver for 5 mm screws



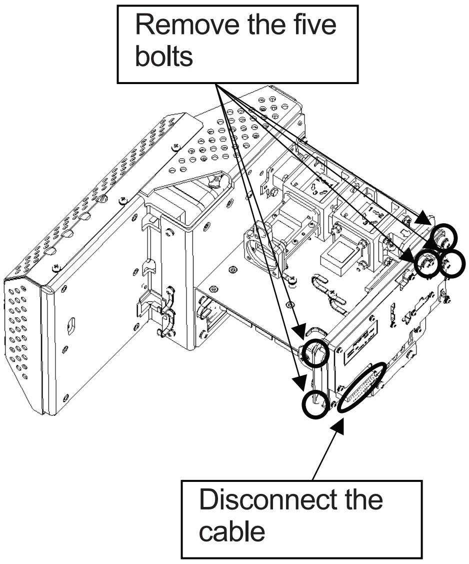
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

1 Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.



2 Remove the screws (five M4 screws) holding the receiver in place and remove the cables connected to the receiver, then replace the receiver.



3 Transfer the metal fitting from the removed receiver to the replacement receiver and fit the receiver into the casing.

After having replaced the receiver, reassemble the unit by following the disassembly procedure in the reverse order.

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar and emit radar waves once the countdown is finished, and check that the radar image is correctly displayed. Transmit radar signals on a long range and open the service engineer menu to adjust the tuning. Perform the adjustment in the service engineer menu until the tuning display bar on the display unit reaches the eighth calibration mark.

4.7.9 Encoder CHT-71A

[Required tools]

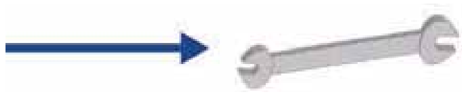
- A Phillips screwdriver for 4 mm screws



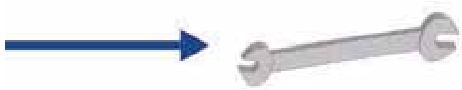
- A Phillips screwdriver for 5 mm screws



- A wrench (width across flats 7 mm for M4 bolts)



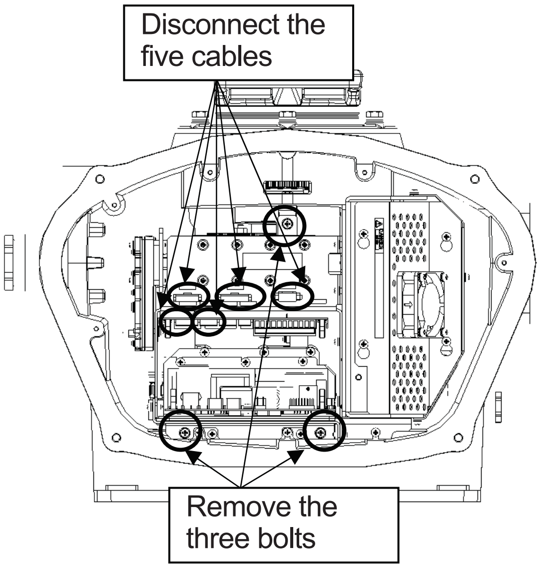
- A wrench (width across flats 8 mm for M6 bolts)



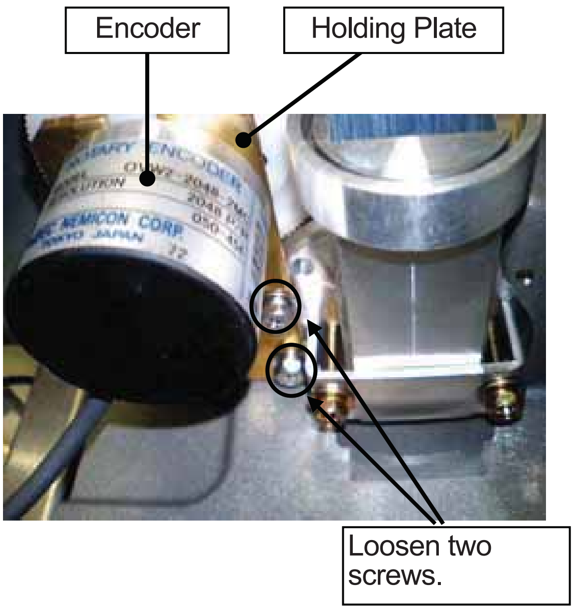
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

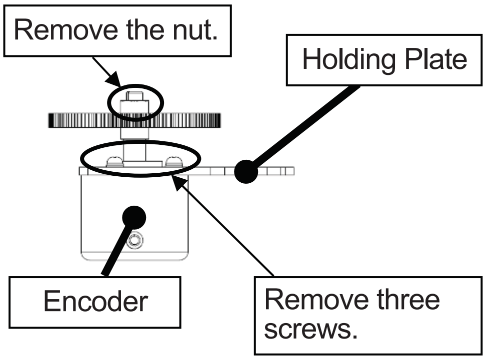
1 Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.



2 Loosen the screws (two M4 screws) and remove the encoder together with the metal fitting.



3 Remove the metal fitting and the gear wheel from the encoder, attach them to the replacement encoder and fit it into the casing.



4 After having replaced the encoder, reassemble the unit by following the disassembly procedure in the reverse order.
Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar and emit radar waves once the countdown is finished, and check that the radar image is correctly displayed. Open the service engineer menu and adjust the azimuth.

4.7.10 Magnetron Fan H-7BFRD0002

[Required tools]

- A Phillips screwdriver for 4 mm screws



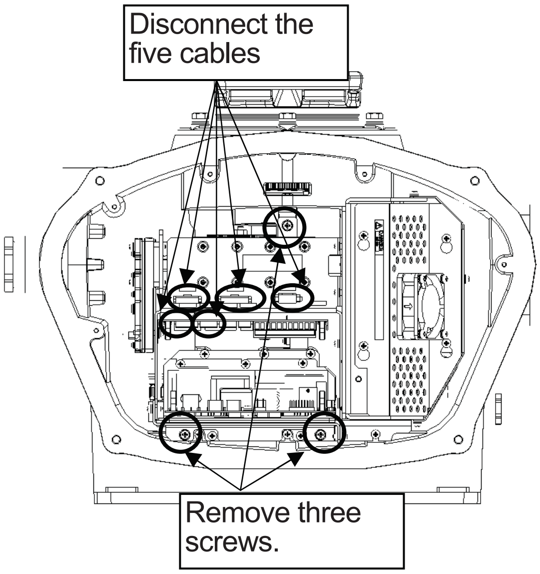
- A Phillips screwdriver for 5 mm screws



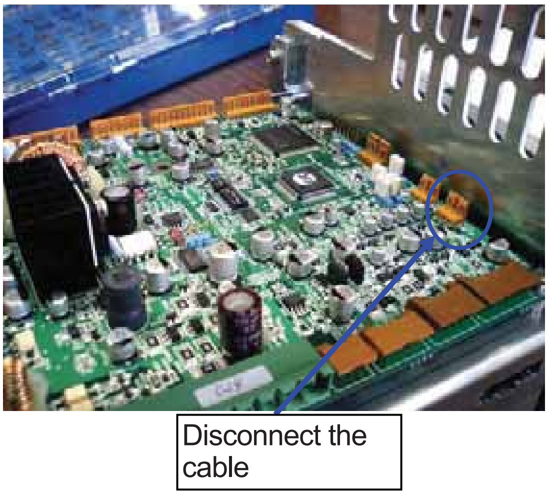
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

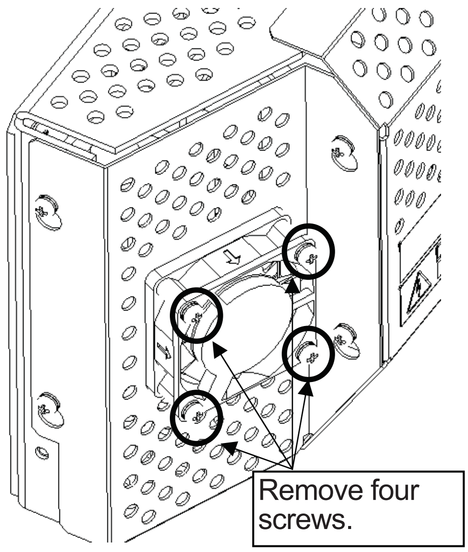
1 Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.



2 Remove the cable for the fan that is connected to the T/R control circuit board.



3 Remove the screws (four M4 screws) holding the fan in place and replace the fan.



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4 After having replaced the fan, reassemble the unit by following the disassembly procedure in the reverse order.

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar and emit radar waves once the countdown is finished, and check that the radar image is correctly displayed. Check that the fan alarm is not triggered.

4.7.11 Modulator Fan H-7BFRD0002

[Required tools]

- A Phillips screwdriver for 4 mm screws



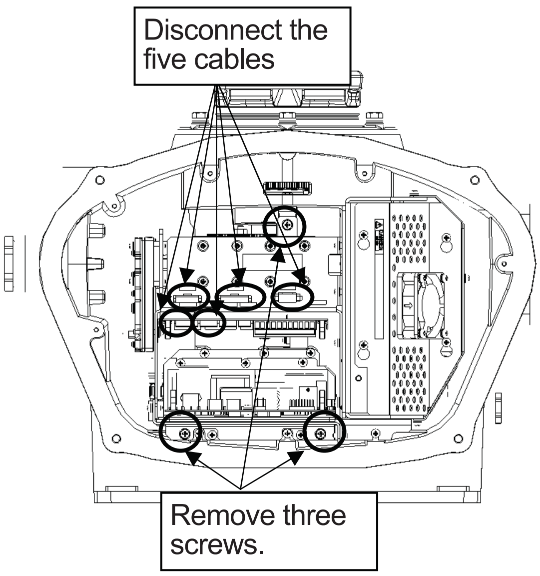
- A Phillips screwdriver for 5 mm screws



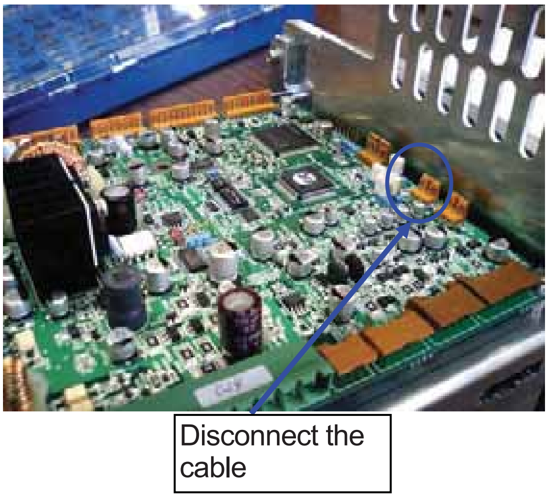
- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

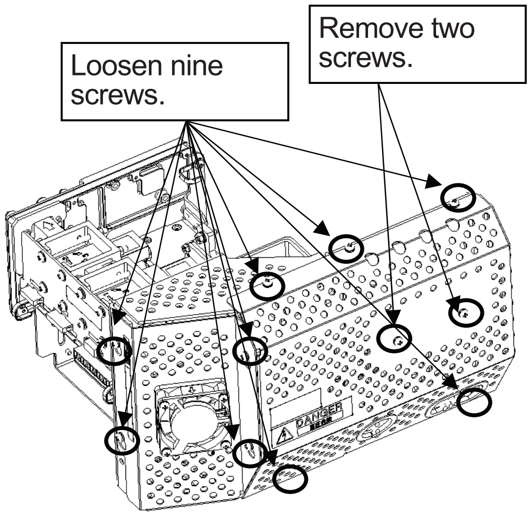
1 Remove the cover on the right (starboard) side (see Section 4.7), remove the cables connected to the transmitter-receiver unit and the screws (three M5 screws) holding the transmitter-receiver unit in place, and remove the transmitter-receiver unit.



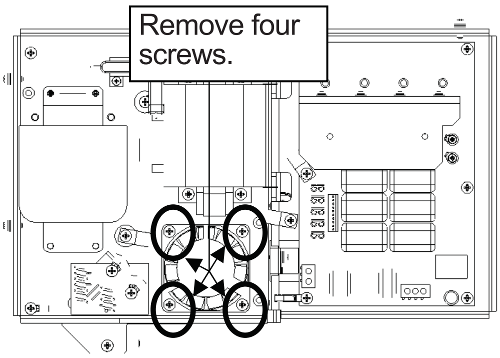
2 Remove the cable for the fan that is connected to the T/R control circuit board.



3 Loosen the screws (nine M4 screws) holding the cover in place, remove the screws (two M4 screws) holding the heat radiation plate in place, and remove the cover.



4 Remove the screws (two M4 screws) holding the fan in place and replace the fan.



5 After having replaced the fan, reassemble the unit by following the disassembly procedure in the reverse order.
Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1 Turn on the radar and emit radar waves once the countdown is finished, and check that the radar image is correctly displayed. Check that the fan alarm is not triggered.

4.7.12 Brake Circuit CFA-257

[Required tools]

- A Phillips screwdriver for 3mm screws



- A Phillips screwdriver for 4 mm screws

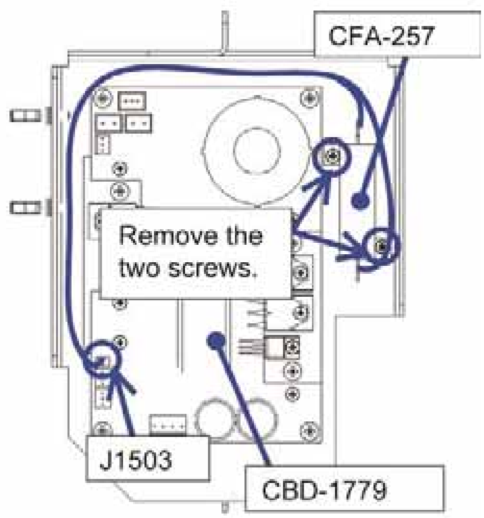


- Tools for removing the scanner unit covers (See Section 4.7)

[Replacement procedure]

1 Open the cover from the left (port) side (see Section 4.7), detach the plate on which the motor control power circuit (CBD-1779) is mounted (see Section 4.7.3).

2 Disconnect the cables that are connected to J1503 of the motor control power circuit (CBD-1779).



3. Remove the two screws (M3) that secure the resistor, and replace the brake circuit (CFA-257, resistor with cable).
4. After the brake circuit replacement, carry out the work in reverse order of removal.

Note:

Be sure to tighten all the bolts and screws and connect all the cables.

[Operation check]

After completing the replacement work, check the operation by following the procedure below.

1. Turn on the radar, transmit radar signals when the countdown is finished, and check that radar images are displayed normally.

4.8 Display Unit

Before replacing each circuit, remove the stand from the unit.

[Note]

Do not directly touch the LCD surface.

To protect the LCD surface and parts, carry out the work on a soft cloth.

Also refer to the exploded diagram of NCD-2182.

[Required tools]

- A Phillips screwdriver for 4 and 6 mm screws



[Removal]

1 Turn the knob bolt on both sides to remove the stand from the unit.

4.8.1 I/F Circuit CMH-2235

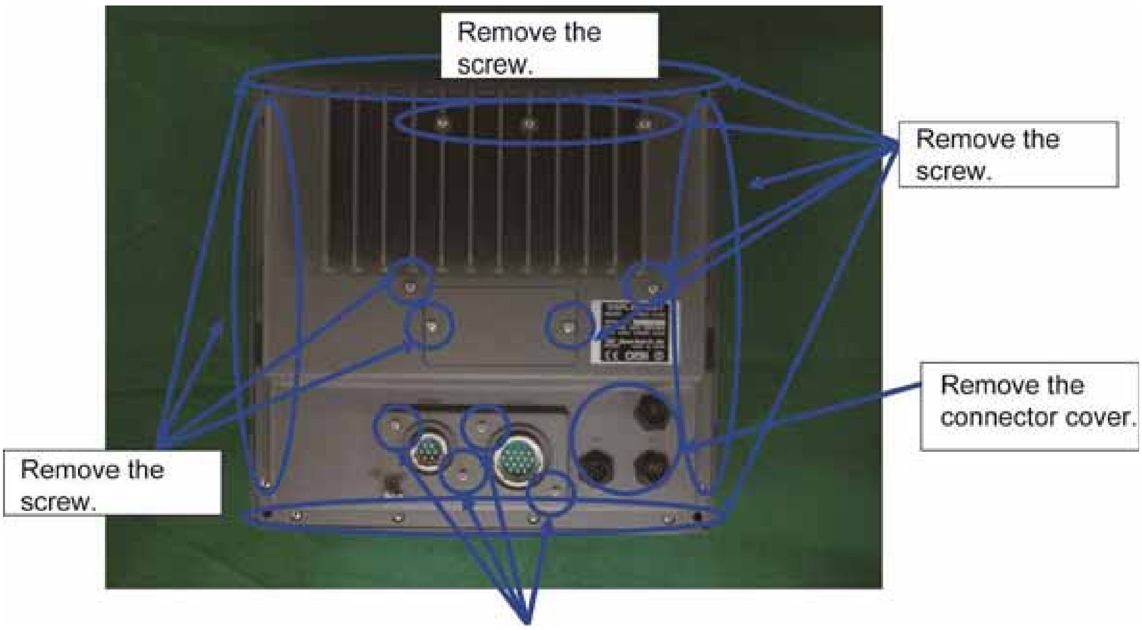
[Required tools]

- A Phillips screwdriver for 3 mm screws

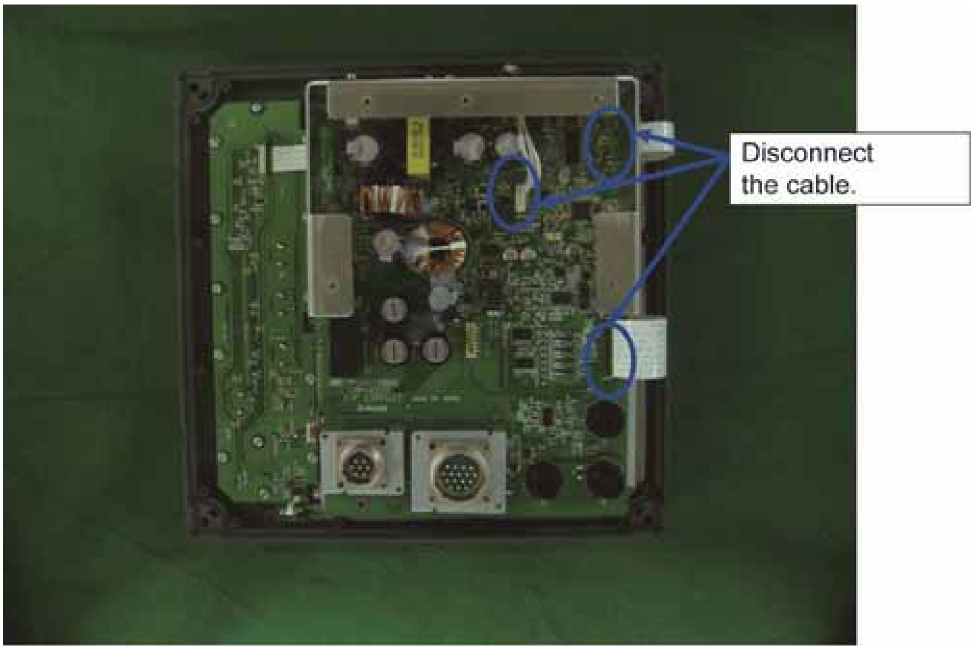


[Removal]

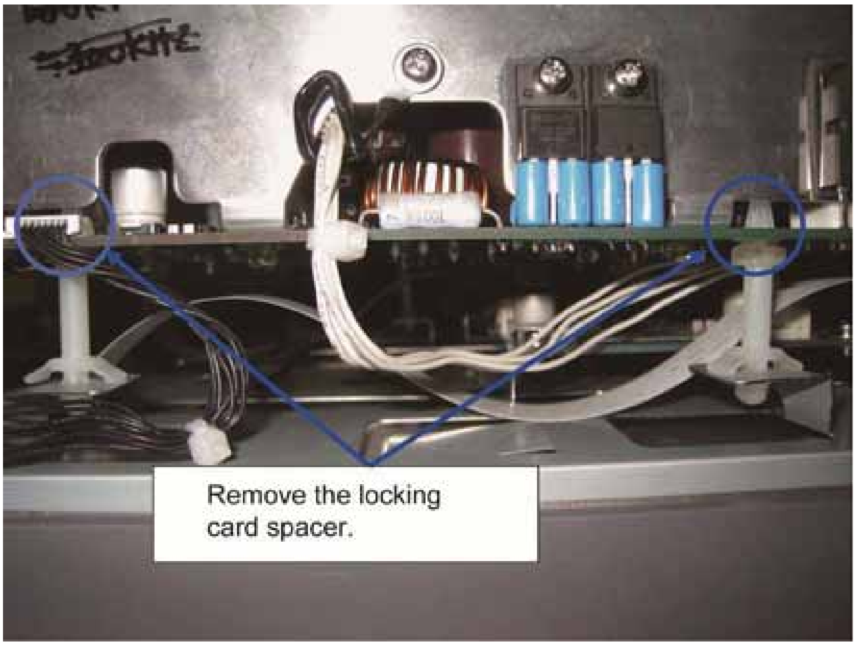
1 Remove 29 screws and three covers of LTW connector, then remove the display unit cover.



2 Disconnect three cables connected to the I/F circuit.



3 Remove the locking card spacer between the LCD push plate and the I/F circuit, then remove the I/F circuit.



[Mounting]

1 Assemble the unit in reverse order of removal.

[Operation check]

1 Check that the equipment starts normally.

2 Transmit radar signals and check that radar images are displayed normally.

4.8.2 Processing circuit CDC-1346BR

[Note]

Save necessary setup data onto a USB memory before starting the replacement. Take notes of the transmission time and operating time of the scanner unit.

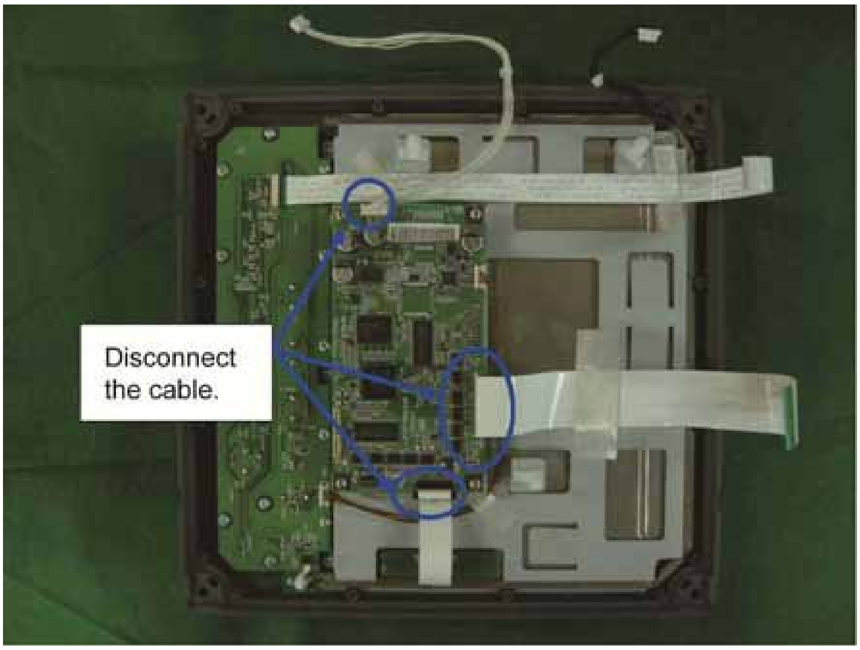
[Required tools]

- A Phillips screwdriver for 3 mm screws



[Removal]

1. Remove the display unit cover according to Section 4.8.1.
2. Remove the cables connected to the I/F circuit according to Section 4.8.1, then remove the board.
3. Remove three cables connected to the processing circuit.



4 Remove the four screws that secure the processing circuit, and replace it.



[Mounting]

1 Confirm that the DIP switch settings are the same between the old and new processing circuits.

2 Assemble the unit in reverse order of removal.

[Operation check]

1 Check that the equipment starts normally.

2 Check that an error message is not displayed.

3 Restore the setup data you saved, and set the transmission time and operating time of the scanner unit you wrote down.

4 Transmit radar signals and check that radar images are displayed normally.

5 Check that the connected external sensors (e.g., true bearing, ship speed, latitude/longitudinal, and AIS) are displayed normally.

4.8.3 Operation circuit CCK-991

[Required tools]

- A Phillips screwdriver for 3 mm screws



[Removal]

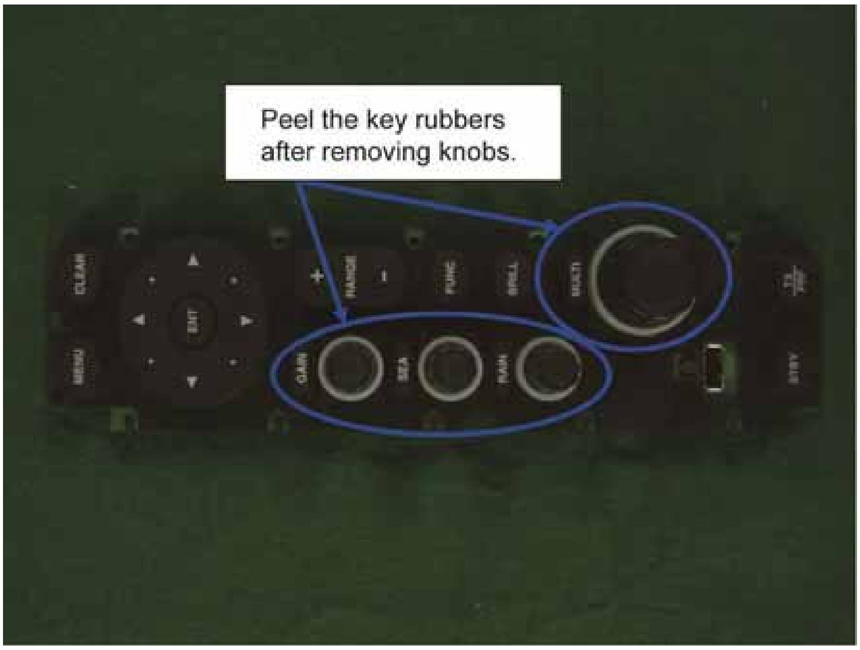
1. Remove the display unit cover according to Section 4.8.1.
2. Remove three cables connected to the operation circuit.



3. Remove 13 screws that secure the operation circuit.



4 Remove the GAIN/SEA/RAIN/MULTI controls and key rubber, then replace the board.



[Mounting]

1 Assemble the unit in reverse order of removal.

[Operation check]

1 Check that the equipment starts normally.
2 Check that an error message is not displayed.
3 Perform a key test, buzzer test, and light test according to Section 4.3 of the instruction manual, and check that no abnormality is detected.
4 Check that the controls turn smoothly.
5 Confirm that you feel the reaction (clicking) of each control when pressing it.

4.8.4 Operation circuit CCK-1017

[Required tools]

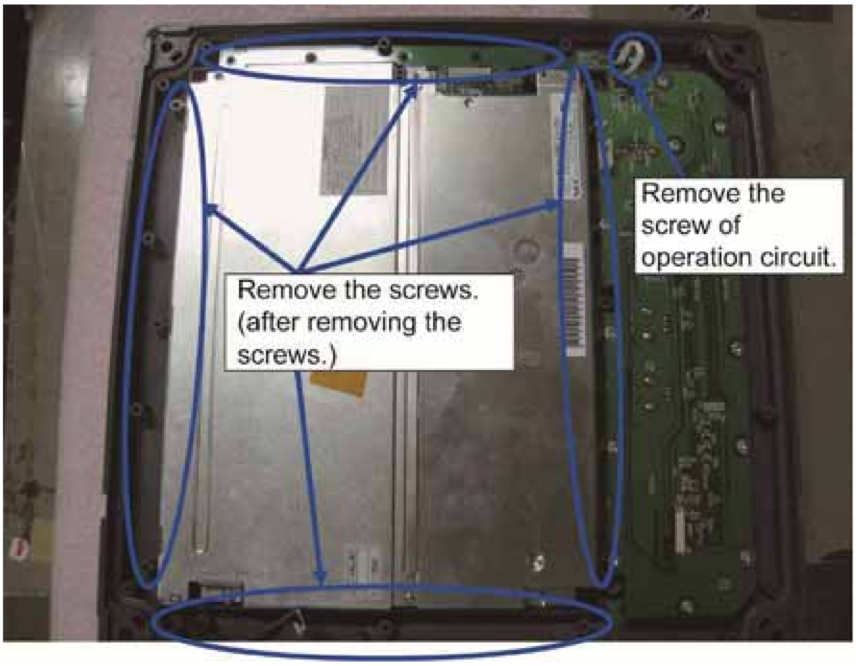
- A Phillips screwdriver for 3 mm screws



[Removal]

1 Remove the display unit cover according to Section 4.8.1.

2 Remove 14 screws that secure the LCD push plate and one screw that secures the operation circuit, then replace the operation circuit.



[Mounting]

1 Assemble the unit in reverse order of removal.

[Operation check]

1 Check that the equipment starts normally.

2 Check that an error message is not displayed.

3 Perform a key test and light test according to Section 4.3 of the instruction manual, and check that no abnormality is detected.

4.8.5 LCD panel CML-806

[Required tools]

- A Phillips screwdriver for 3 mm screws

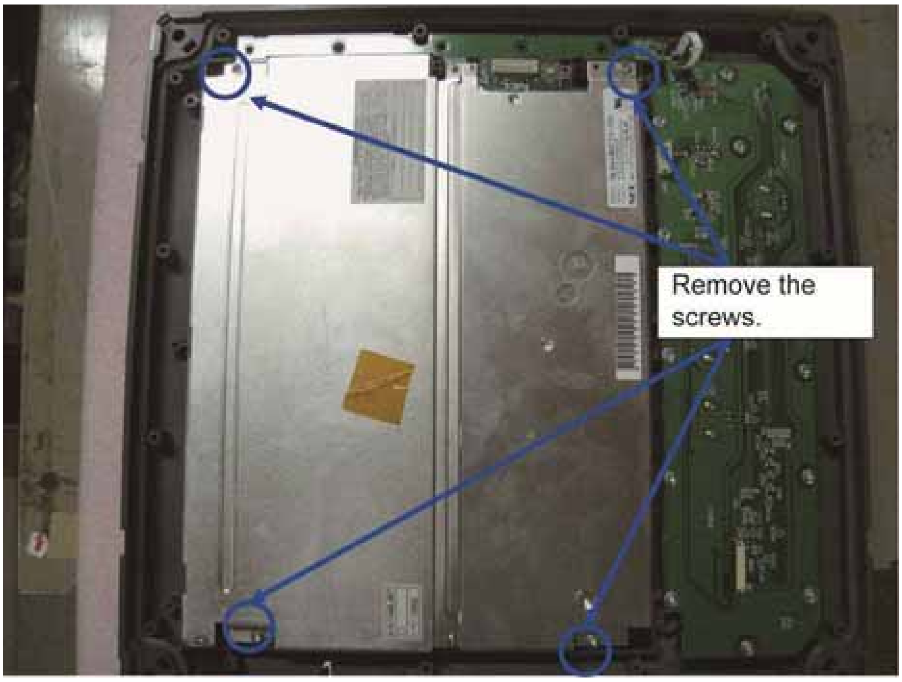


[Removal]

1. Remove the display unit cover according to Section 4.8.1.
2. Remove 14 screws that secure the LCD push plate according to Section 4.8.4.
3. Remove the CQC-1262 board.



4 Remove four screws that secure the LCD panel, then remove the LCD panel from the front panel.



[Mounting]

1 Attach the LCD panel to the front panel.

2 Assemble the unit in reverse order of removal.

4.8.6 Mounting RGB unit NQA-2400

Connect the RGB output cable to display the video on the external monitor.

■ Items to be prepared

- External monitor connection cable
- Monitor connected

[Required tools]

- A Phillips screwdriver for 3 mm screws



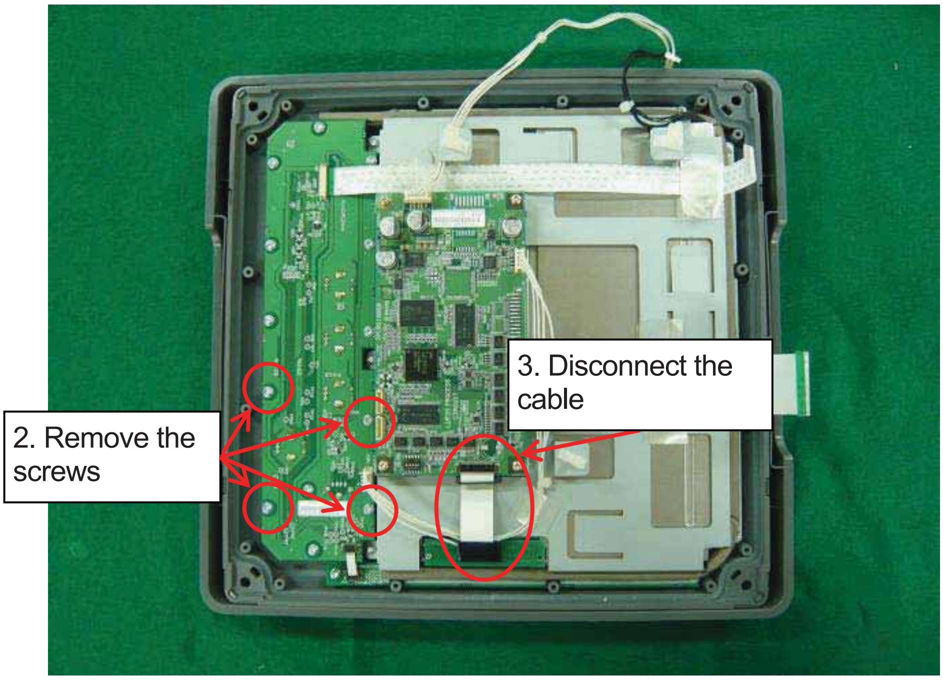
Note:

The video is not displayed with the JRC's monitor NWZ-146.

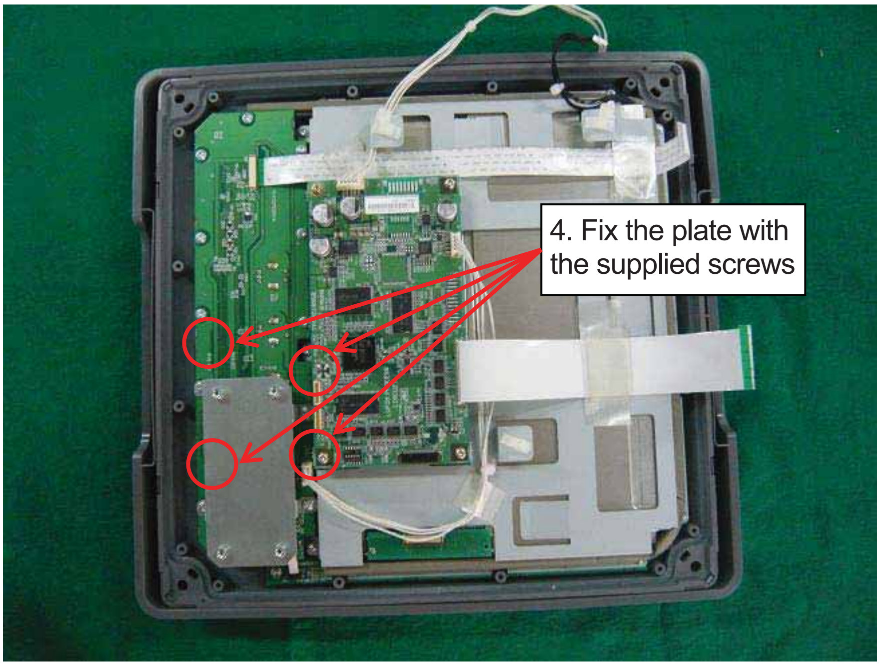
Currently, we have confirmed that the video is displayed with NWZ-164 and NWZ-173.

[Mounting]

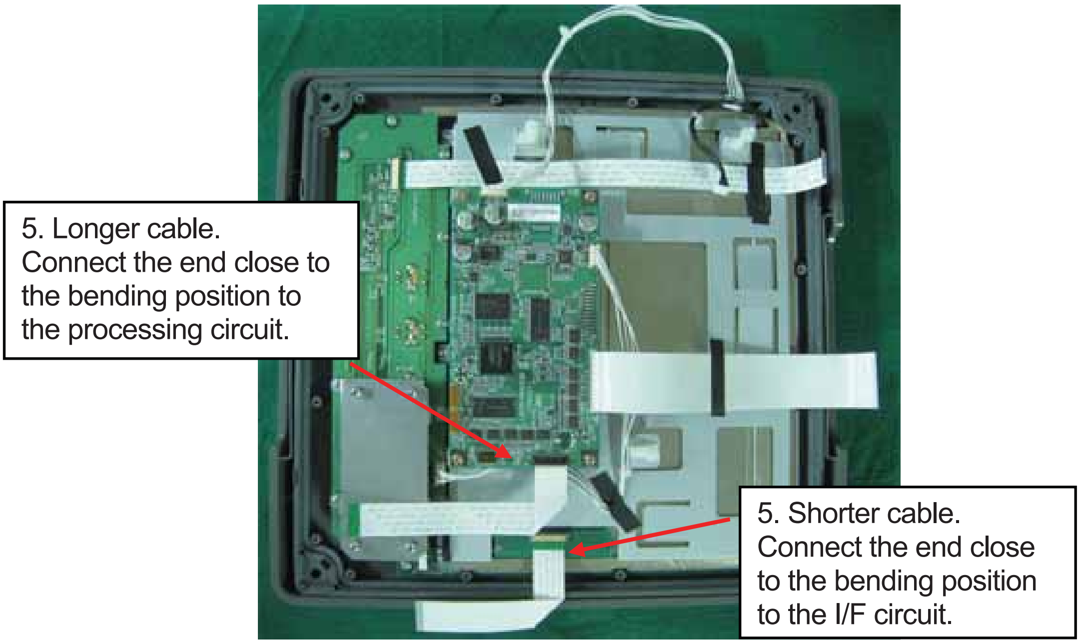
1. Refer to the Field Service Manual to remove the display unit cover and the I/F circuit CMH-2235.
2. Remove the following 4 screws that secure the operation circuit CCK-991.
3. Remove the cable between the processing circuit CDC-1346BR and the I/F circuit CQC-1262.



4. Fix the plate for securing board as shown in the figure with the 4 supplied tapping screws.

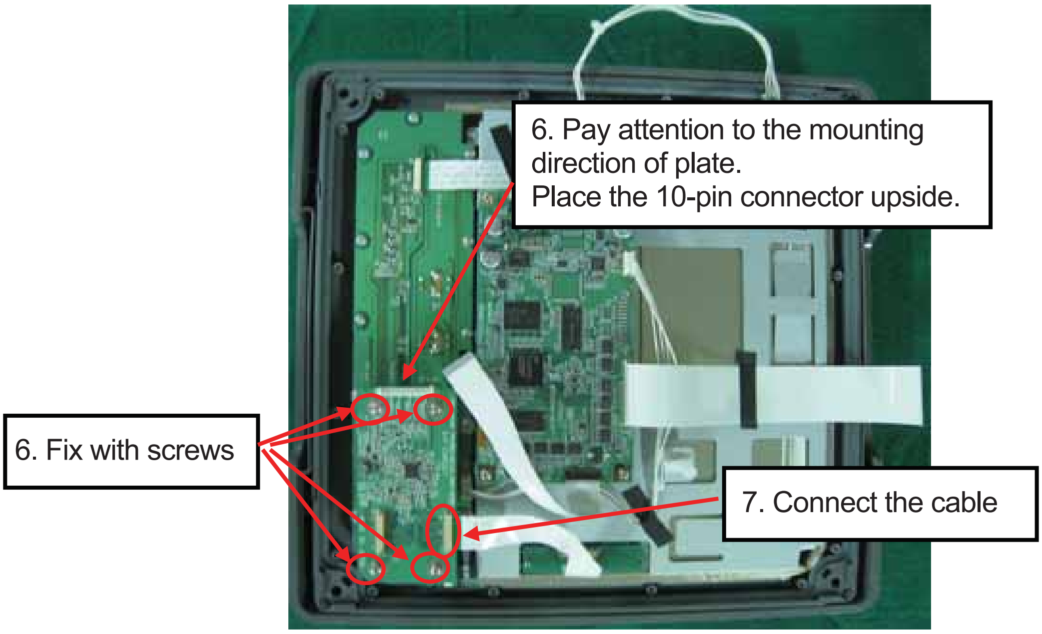


5 Connect the supplied cable to the processing circuit CDC-1346 and the LCD_I/F circuit CQC-1262 (pay attention to the direction).

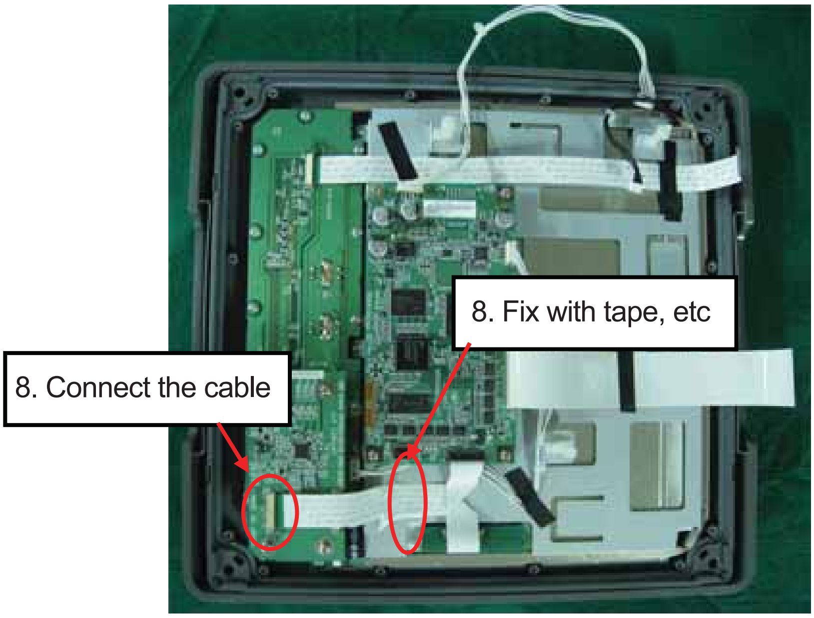


6 Fix the I/F circuit CMH-2383 to the plate using the 4 supplied screws.

7 Connect the cable which has been connected to the LCD_I/F circuit to the connector on the edge side of the I/F ciucuit CMH-2383 board.



8 Connect the cable which has been connected to the processing circuit to the middle connector of the I/F circuit CMH-2383 board, and fix the cable to the LCD fixing plate using the supplied tape.



Note:

The cable is easily disconnected. Therefore, check if the connector is firmly locked and the cable is securely connected.

9 Reassemble the I/F circuit CMH-2235 following the disassembly procedure in the reverse order.



10 Connect the RGB cable to the I/F circuit CMH-2383.



11 Drag the RGB cable out through the hole for fuse replacement.



12 Attach the rear cover with a RGB cable.



Chapter 5 Program Update

5.1 Update procedure for the display unit program

Update the display unit program using a USB flash memory.

■ Items to be prepared

- USB flash memory
- Update program file

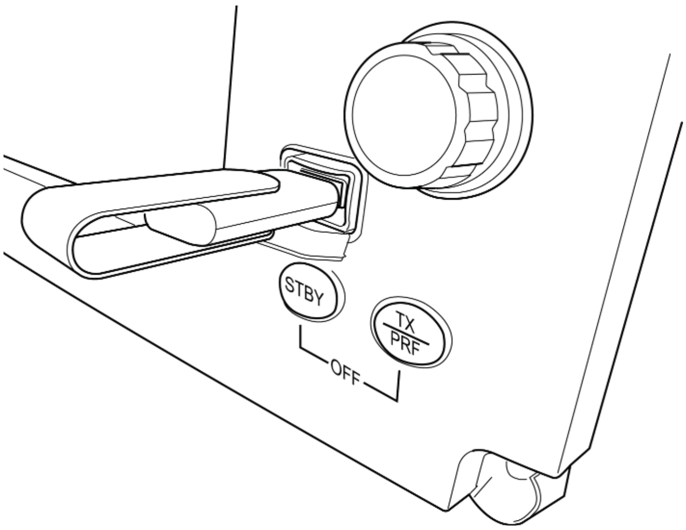
  File name: * * * * * .apg

  ("* * * * *" indicates the display unit version.)



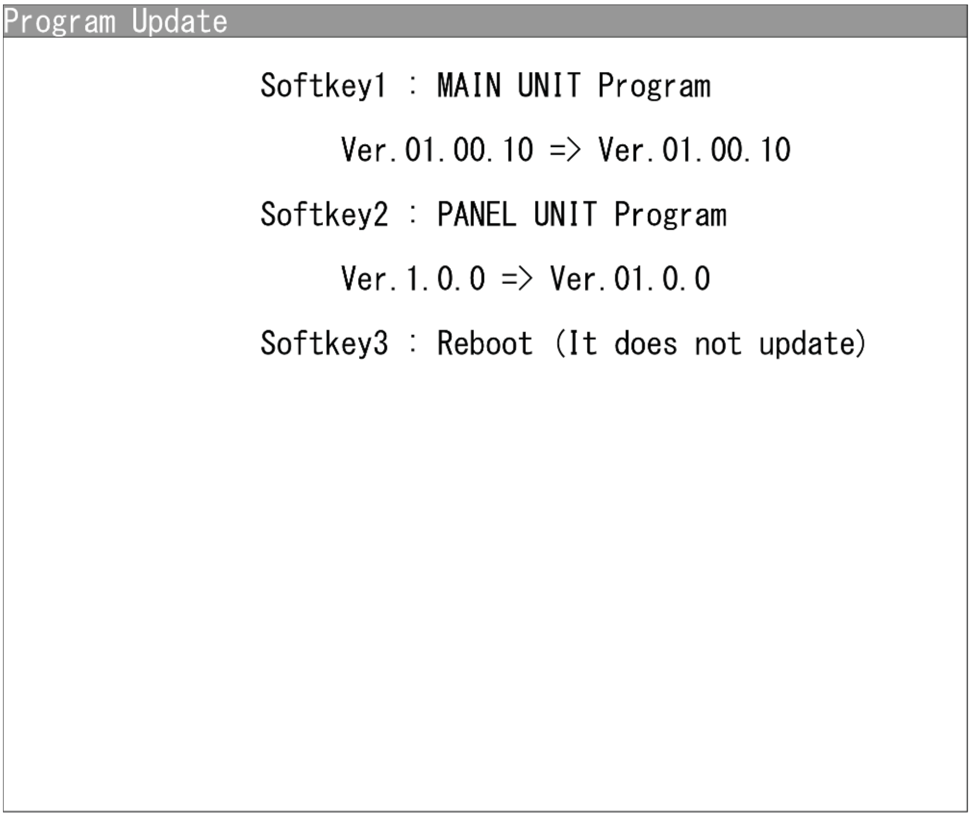
■ Updating

1 Insert the USB flash memory to the display unit panel.



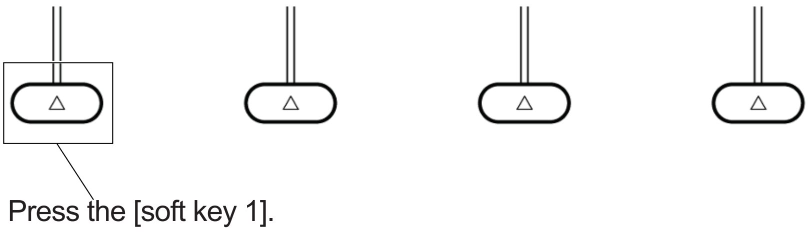
2 Press the [STBY] key.

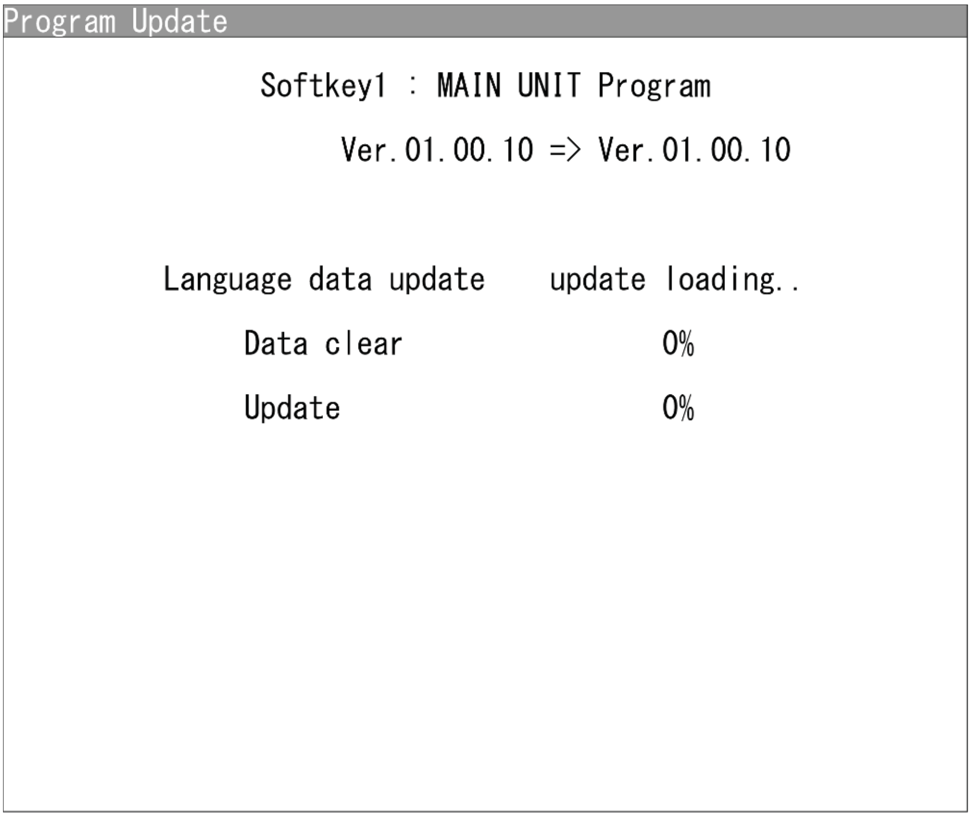




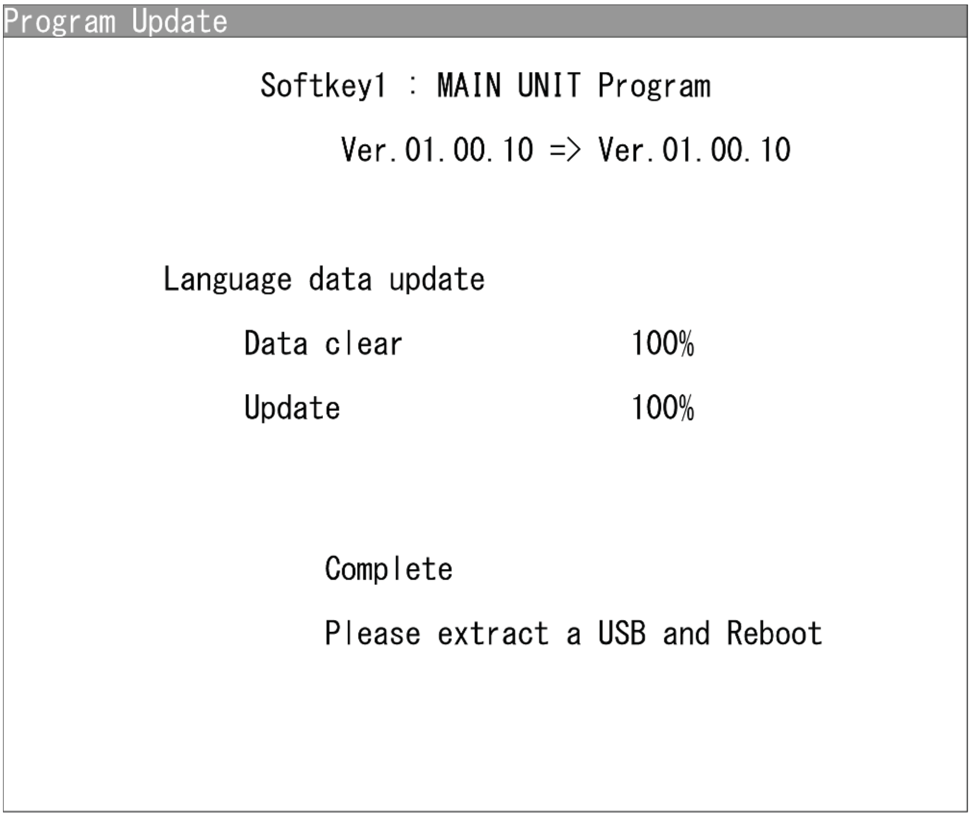
After the opening screen appears, "Proagram Update" appears.

3 Press the soft key 1.



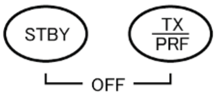


The program update starts.



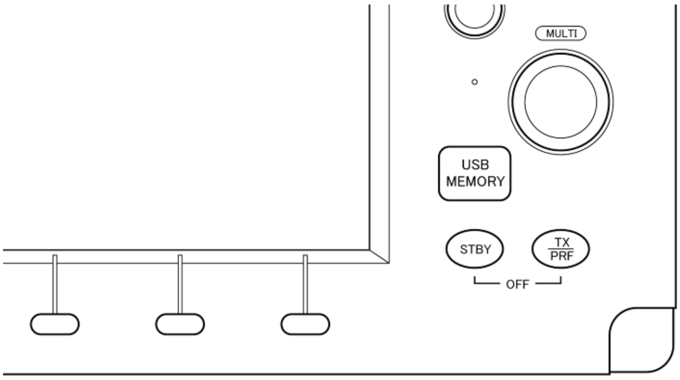
The program update is finished.

4 Press the [STBY] key and the [TX/PRF] key simultaneously.



The system is turned off.

5 Disconnect the USB flash memory from the display unit panel.



■ Operation check

After the program update, perform the following operations.

1 Press the [STBY] key to check the unit is turned on.

2 Press the [TX/PRF] key to check the radar video is displayed.

3 Check "Display unit (software version)" of System INFO.

System Information	▲▼
1． Indicator	
2． Panel1	1.0.0
3． Panel2	-.-.-
4． Antenna	-.--
5． NSK	--.--
6． Boot	01.05
7． Test Bench	01.03

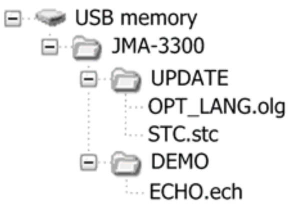
5.2 Table Update Procedure

Update the table only in the display unit program.

■ Items to be prepared

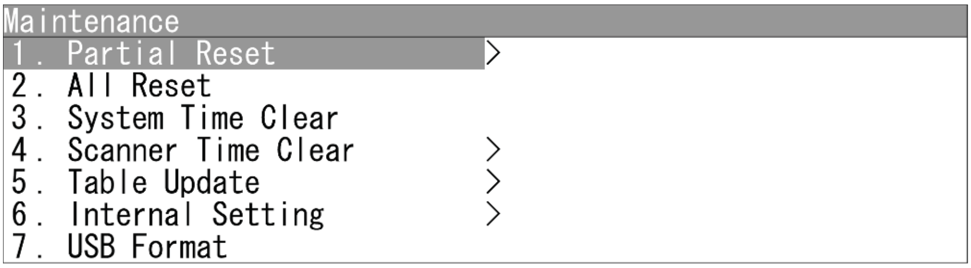
- USB flash memory
- Update program file

STC curve file name::	STC.stc
Option language file name:	OPT_LANG.olg
Echo simulation file name:	Echo.ech



■ "Table Update" operations

1 Open [Maintenance] from the Adjust Menu.



"Maintenance" menu appears.

2 Open [Maintenance] - [Table Update].



"Table Update" menu appears.

■ STC Curve Update

Load the STC curve table on the FROM via USB for updating.

1 Open [Table Update] - [STC Curve].

The STC curve table is updated.

■ Color Table Update

Load the echo/trail color table on the FROM via USB for updating.

1 Open [Table Update] - [Color].

The color table is updated.

■ Insert Language Update

Loads the additional language via USB, and updates the option languages on the FROM.

1 Open [Table Update] - [Insert Language].

Updates the option languages.

■ Echo Simulation Update

Load the echo simulation data on the FROM via USB for updating.

1 Open [Table Update] - [Echo Simulation].

Updates the echo simulation data.

5.3 Update procedure for the operation unit program

Update the operation unit program using a USB flash memory.

■ Items to be prepared

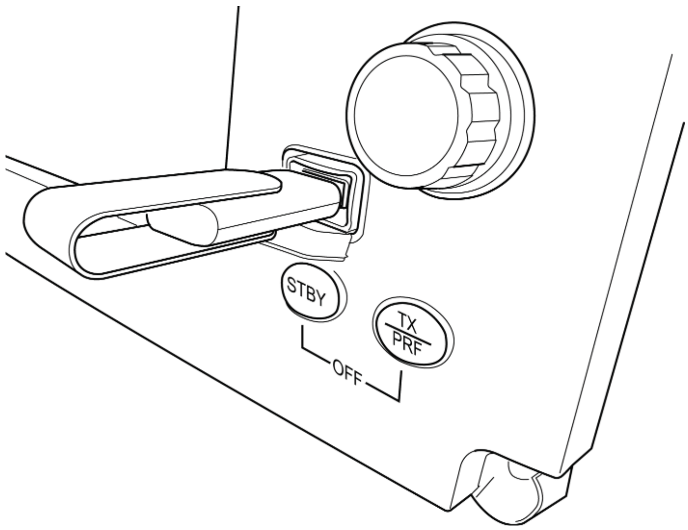
- USB flash memory
- Update program file

  File name: * * * * * .opg ("* * * * *" indicates the operation unit version.)



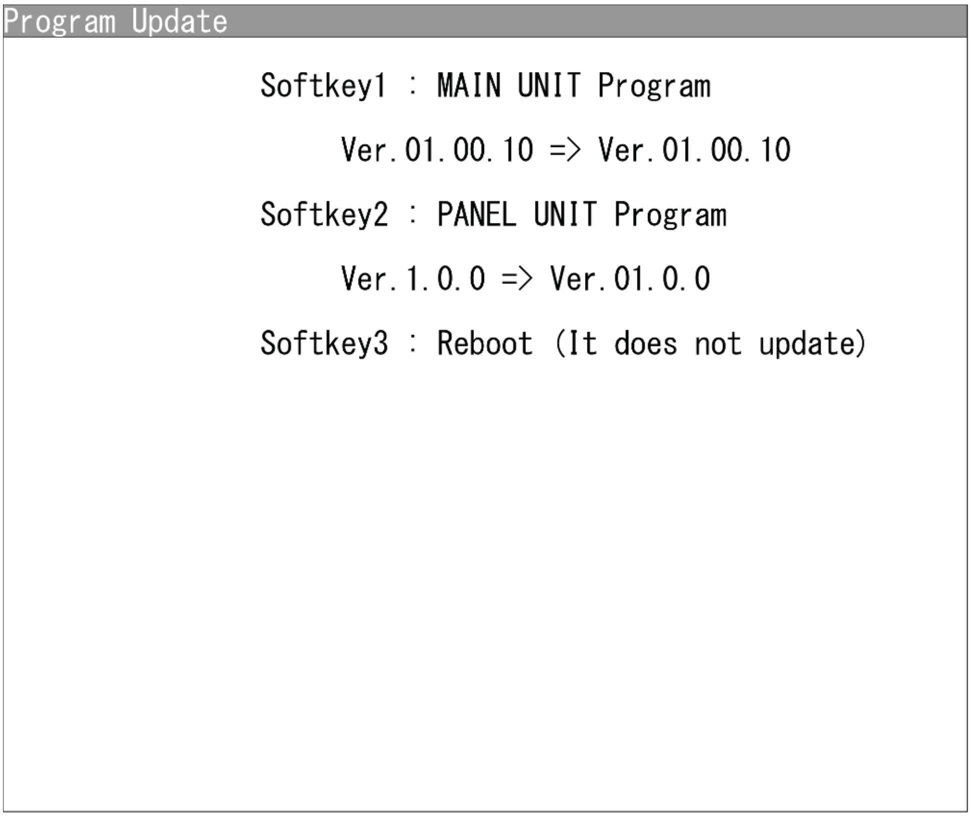
■ Updating

1 Insert the USB flash memory to the display unit panel.



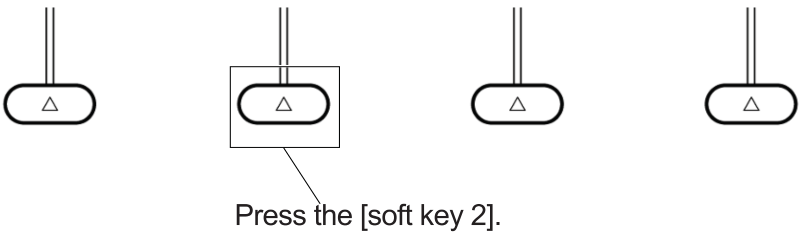
2 Press the [STBY] key on the display unit.

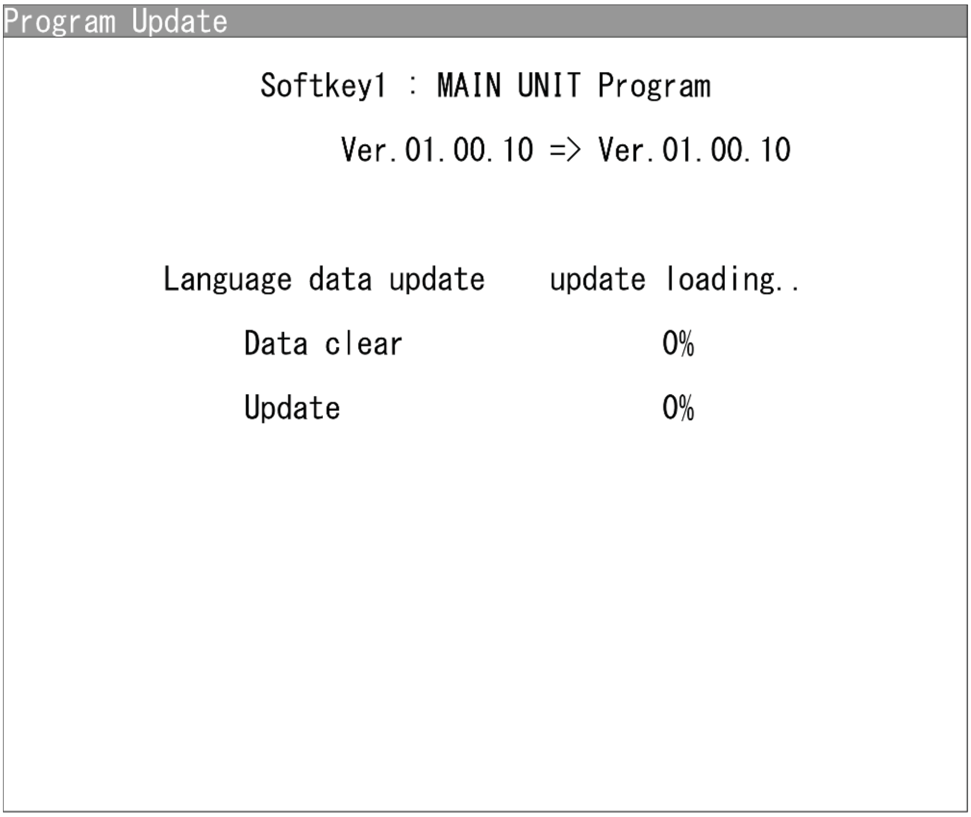




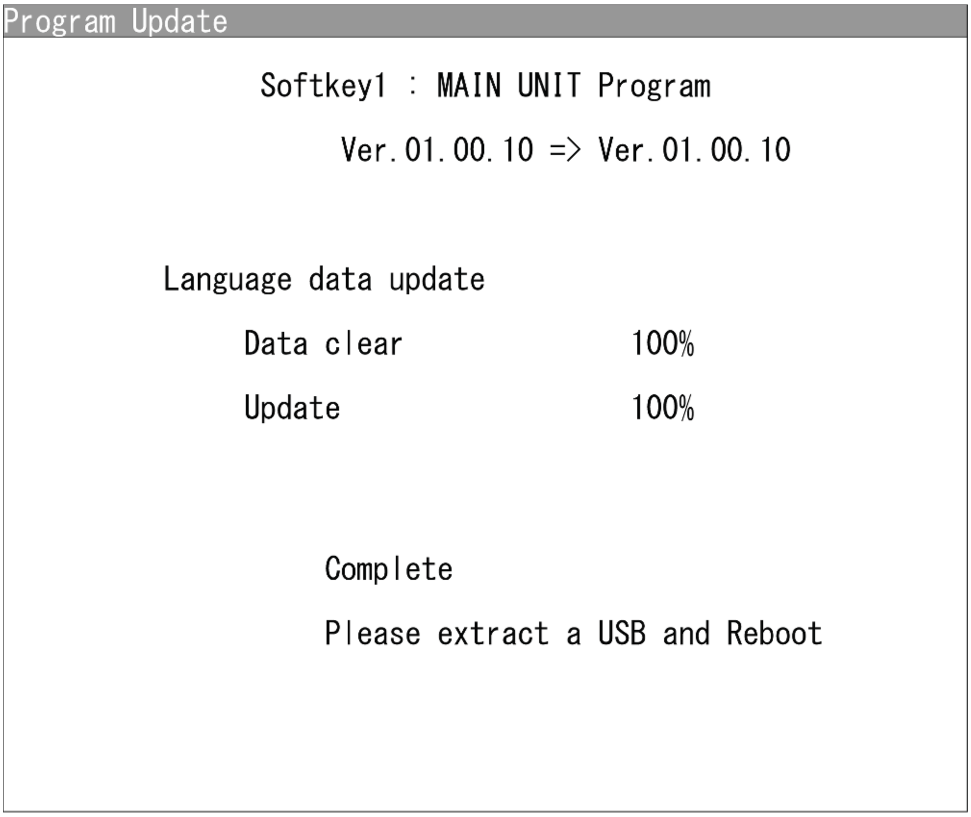
After the opening screen appears, "Proagram Update" appears.

3 Press the soft key 2.



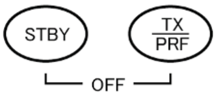


The program update starts.



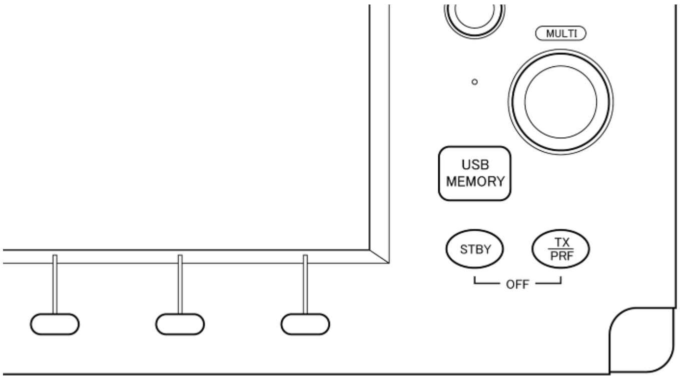
The program update is finished.

4 Press the [STBY] key and the [TX/PRF] key on the display unit simultaneously.



The system is turned off.

5 Disconnect the USB flash memory from the display unit panel.



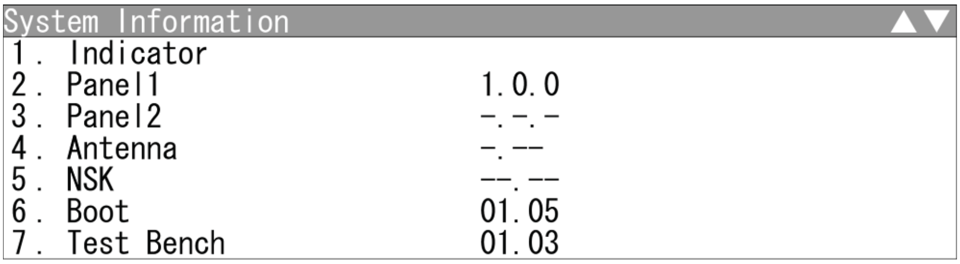
■ Operation check

After the program update, perform the following operations.

1 Press the [STBY] key to check the unit is turned on.

2 Press the [TX/PRF] key to check the radar video is displayed.

3 Check "Panel1 (software version)" of System INFO.



Chapter 6 Trouble shooting

Make operational check on the radar equipment regularly and if any problem is found, investigate it immediately. Pay special attention to the high voltage sections in checking and take full care that no trouble is caused by any error or carelessness in measurement. Take note of the results of checking, which can be used effectively in the next check work.

6.1 Performance Check

The performance status of this radar equipment can be checked on the Test Menu.

■ "Test" operations

1 Open [Test] from the Main Menu.

```
Test
1. System Information
2. System Time
3. Scanner Information
4. Hardware Information
5. Error Log                    >
6. Line Monitor
7. Self Test                    >
```

"Test" menu appears.

6.1.1 System information

Displays the current system information (software version information).

■ "System Information" operations

1 Open [Test] - [System Information].

```
System Information                                ▲▼
1. Indicator
2. Panel1                 1.0.1
3. Panel2                 -.-.-
4. Antenna                -.--
5. NSK                    --.--
6. Boot                   00.00
7. Test Bench             00.00
```

```
System Information                                ▲▼
8. Update                 00.00
9. DSP                    00.00.00.00(MC)
                          00.00.00.00(V)
```

The software version is displayed.

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Field Service Manual

6.1.2 System time

Displays the following system time information.

- Indicator Running Time
- Scanner Transmit Time
- Scanner Motor Time
- Scanner Running Time

■ "System Time" operations

1 Open [Test] - [System Time].

```
System Time
1. Indicator Running Time    1hour
2. Scanner Transmit Time     1hour
3. Scanner Motor Time        1hour
4. Scanner Running Time      1hour
```

"System Time" menu appears.

6.1.3 Scanner information

Displays the following scanner information.

- Transmitted output power
- Motor Type
- Magnetron Current

■ "Scanner INFO" operations

1 Open [Test] - [Scanner INFO].

```
Scanner Information
1. Scanner Transmit Power    -----
2. Motor Type                -----
3. Magnetron Current
                                 0
```

"Scanner INFO" menu appears.

6.1.4 Hardware information

Displays the following hardware information.

- Serial Number
- MAC Address
- Temperature

■ "Hardware Information" operations

1 Open [Test] - [Hardware Information].

```
Hardware Information
1. Serial Number
2. MAC Address
3. Temperature              51.0℃
4. Monitor Brilliance       511
```

"Hardware INFO" menu appears.

6.1.5 Error log

The error log displays previously occurred system alarms with the dates and times when they occurred.

■ "Error Log" operations

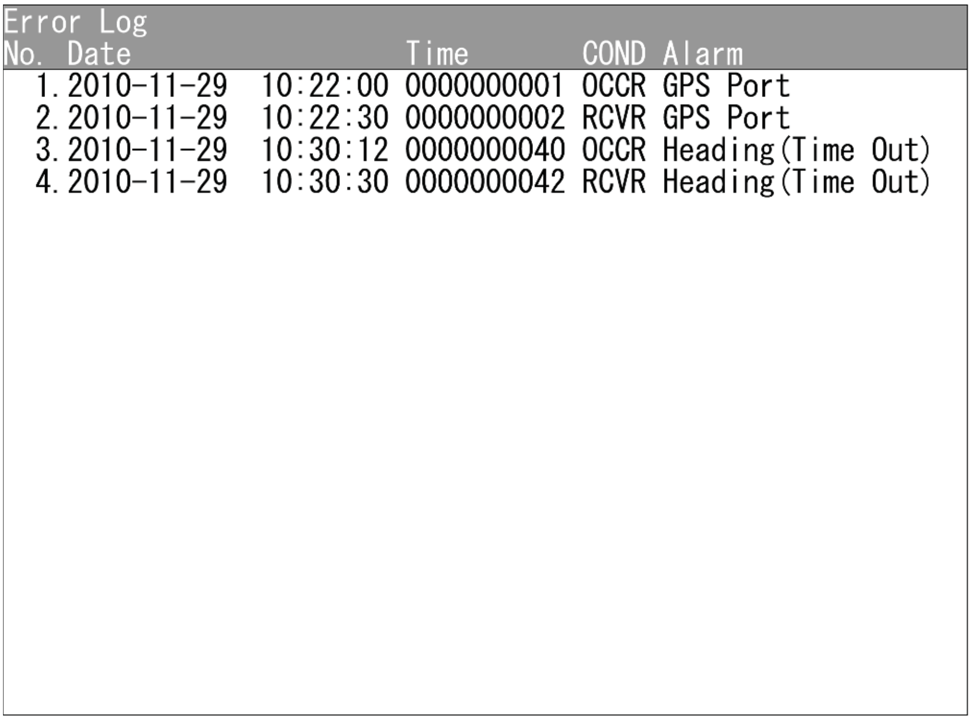
1 Open [Test] - [Error Log].

```
Error Log
1. Display
2. Erase
```

"Error Log" menu appears.

■ Displaying Error Log

1 Open [Error Log] - [Display].

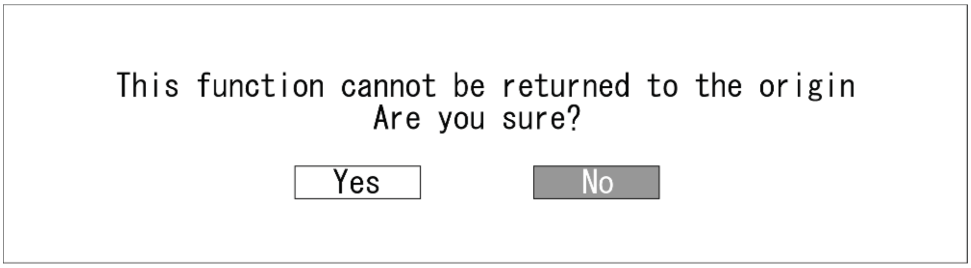


"Error Log" menu appears.

For details of alarms, see Section "4.5.1 List of Alarms and other Indications" of "Instruction manual".

■ Erasing Error Log

1 Open [Error Log] - [Erase].



[Yes]	: Erases the error log.
[No]	: Does not erase the error log.

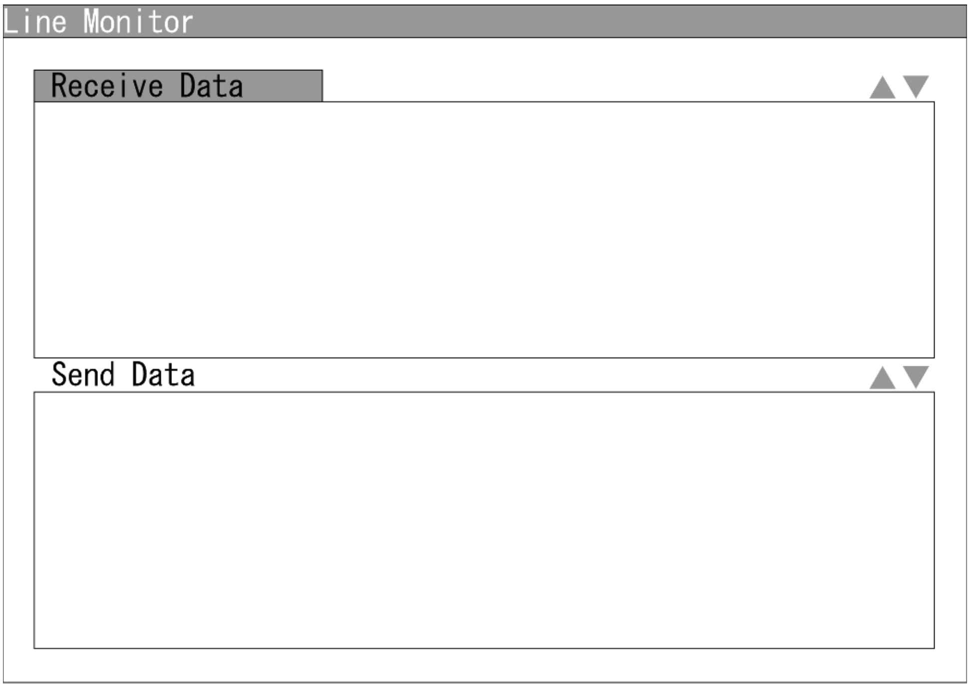
6.1.6 Line monitor

Serial communication data can be seen on the built-in Line monitor.

Line monitor can be used to make sure that the serial data are received properly.

■ "Line Monitor" operations

1 Open [Test] - [Line Monitor].



"Line Monitor" menu appears.

Receive Data : The received serial communication data are displayed.

Send Data : The transmitted serial communication data are displayed.

Soft key 1 : [GPS] [NMEA1] [Gyro/Cpmpass] [NMEA2] [Keyboard] [Scanner]

Press the sofy key 1 to select the port for serial communication data.

Soft key 2 : [ASCII] [Binary]

Press the soft key 2 to switch the display.

Soft key 3 : [Stop] [Play]

Press the soft key 3 to stop/start scrolling.

Soft key 4 : [Clear]

Press the soft key 4 to clear all listed serial communication data.

6.1.7 Self test

The following tests can be performed.

- Key Test
- Buzzer Test
- Key Light Test
- Monitor DISP Test
- Memory Test
- Line Test
- Sensor Test

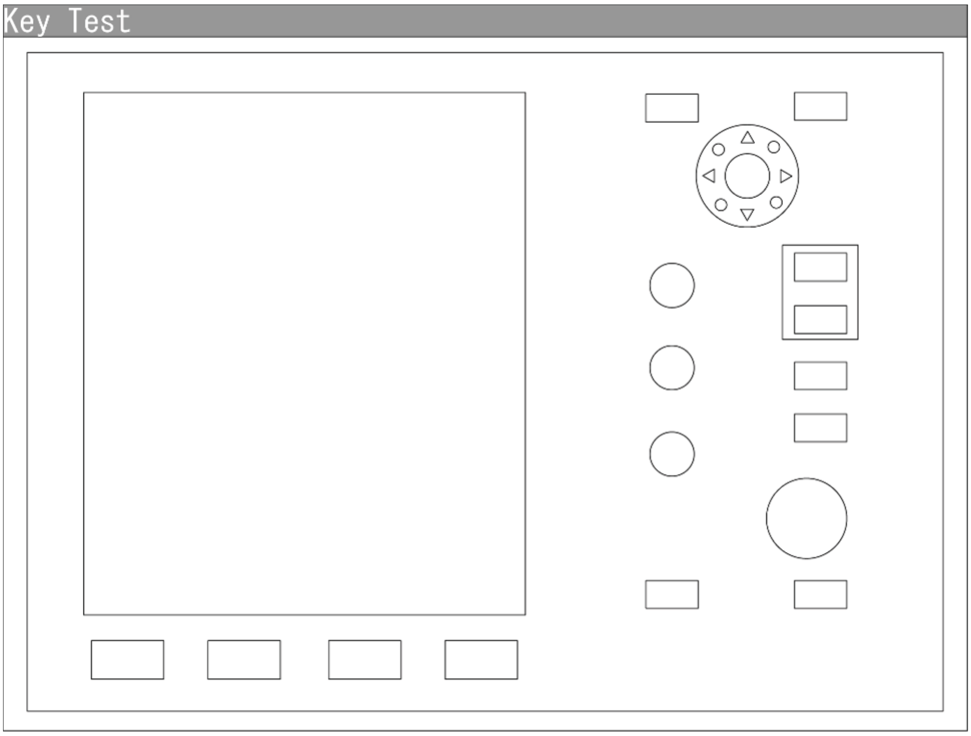
■ "Self Test" operations

1 Open [Test] - [Self Test].

```
Self Test
1. Key Test
2. Buzzer Test
3. Key Light Test
4. Monitor Display Test      >
5. Memory Test
6. Line Test
7. Sensor Test
```

■ Key Test

1 Open [Self Test] - [Key Test].



Operation key video will be displayed.

When pressing each key, the corresponding operation key is color-inverted on the display.

Press the [CLEAR] key to turn off the operation keys.

■ Buzzer Test

1 Open [Self Test] - [Buzzer Test].

The buzzer will sound.

The buzzer automatically stops after it sounds for a certain time.

The buzzer will sound regardless of the buzzer setting.

■ Key Light Test

1 Open [Self Test] - [Key Light Test].

The brightness of the operation panel is gradually intensified.

■ Monitor DISP Test

1 Open [Self Test] - [Monitor DISP Test].

```
Monitor Display Test                ▲▼
1. Pattern1
2. Pattern2
3. Pattern3
4. Pattern4
5. Pattern5
6. Pattern6
7. Pattern7
```

```
Monitor Display Test                ▲▼
8. Pattern8 >
```

[Pattern1] : All colors are filled with white.

[Pattern2] : A white box is displayed on the black background of 1024 × 768 dots.

[Pattern3] : Displays rectangle × 2, circle × 2, and cross-shape× 9 (white lines on the black background).

[Pattern4] : Displays “H” of 9 dots × 9 dots on the entire screen (white character on the black background).

[Pattern5] : Gray scale display (16 levels)

[Pattern6] : Displays a color bar.

[Pattern7] : The square figure of a specified RGB value is shown at the center of the display.

Pattern8	
1. Red	31
2. Green	31
3. Blue	31
4. Display	

Pattern8	Red
1. Red	0-31
2. Green	3 1
3. Blue	
4. Display	▲Value Up
	▼Value Down
	◀Input Digure Left
	▶Input Figure Right

Input the value.

Turn the [MULTI] control to set the value.

The value can be set between 0 and 31.

Operate the same way for the other settings.

■ Memory Test

1 Open Self Test - Memory Test.

Memory Test	
1. SDRAM	OK
2. Flash ROM	OK
3. USB	OK

When no abnormality is found, "OK" is displayed. When an abnormality is found, "NG" is displayed.

Note:

More time may be required for USB detection in order to acquire "OK".

Do not remove USB during memory test.

■ Line Test

1 Open [Self Test] - [Line Test].

Line Test ▲▼	
1 . Scanner	OK
2 . Gyro	OK
3 . Compass	OK
4 . GPS Port	OK
5 . NMEAI Port	OK
6 . Gyro/Compass Port	OK
7 . NMEA2 Port	OK

Line Test ▲▼	
1 . Keyboard Port	OK
2 . Scanner Port	OK
	OK

When no abnormality is found, "OK" is displayed. When an abnormality is found, "NG" is displayed.

■ Sensor Test

1 Open [Self Test] - [Sensor Test].

Sensor Test	
1 . SSW Off	OK
2 . AZI	OK
3 . HL	OK
4 . MHV	OK
5 . Trigger	OK
6 . Video	OK

When no abnormality is found, "OK" is displayed. When an abnormality is found, "NG" is displayed.

6

Field Service Manual

6.2 Error Message List

The following table shows alarms and other indications the system displays.

Table 6.2-1 Alarm list

Alarm name (Japanese)	Alarm name (English)	Class	Description
警報エラー	Alarm Error	Alarm	An abnormality occurred in the error message function.

Table 6.2-2 Alarm list of system alarm: scanner

Alarm name (Japanese)	Alarm name (English)	Class	Description
空中線 安全 SW オフ	Scanner(SSW Off)	Alarm	The safety switch is turned off.
空中線 AZI	Scanner(AZI)	Alarm	The rotation signal (BP) within the scanner cannot be detected.
空中線 HL	Scanner(HL)	Alarm	The rotation reference signal (BZ) within the scanner cannot be detected.
空中線 変調高圧	Scanner(MHV)	Alarm	An abnormality of the high-voltage modulator is detected within the scanner.
空中線 無通信	Scanner(Time Out)	Alarm	No reply from the scanner after data transmission.
空中線 データ	Scanner(Data)	Alarm	Abnormal scanner communication data The data is interrupted. The data checksum does not match.
空中線 EEPROM	Scanner(EEPROM)	Alarm	The initial adjustment value could not be saved to the scanner.
空中線 ヒータ電圧	Scanner(Heater)	Alarm	An abnormality of the magnetron heater voltage is detected within the scanner.
空中線 逆回転	Scanner(Reverse)	Alarm	A reverse rotation is detected within the scanner.
空中線 ビデオ	Scanner(Video)	Alarm	An abnormality of the video signal is detected within the scanner.
空中線 トリガー	Scanner(Trigger)	Alarm	An abnormality of the trigger signal is detected within the scanner.
空中線 ファン 1	Scanner(Fan 1)	Alarm	An abnormality of the Fan 1 is detected within the scanner.
空中線 ファン 2	Scanner(Fan 2)	Alarm	An abnormality of the Fan 2 is detected within the scanner.
空中線 モータ電流	Scanner(Motor)	Alarm	An abnormality of the motor current is detected within the scanner.

Table 6.2-3 Alarm list of system alarm: display unit

Alarm name (Japanese)	Alarm name (English)	Class	Description
操作部 1 無通信	Keyboard1(Time Out)	Alarm	The communication with the operation unit is interrupted.
操作部 2 無通信	Keyboard2(Time Out)	Alarm	The communication with the operation unit is interrupted.
DSP ビデオ	DSP(Video)	Alarm	An abnormality of the video signal is detected by the display unit DSP.
DSP トリガー	DSP(Trigger)	Alarm	An abnormality of the trigger signal is detected by the display unit DSP.
DSP AZI	DSP(AZI)	Alarm	An abnormality of the rotation signal (BP) is detected by the display unit DSP.
DSP HL	DSP(HL)	Alarm	An abnormality of the rotation reference signal (BZ) is detected by the display unit DSP.
DSP 処理異常	DSP Error	Alarm	Abnormal operation of DSP.

Table 6.2-4 Alarm list of system alarm: external equipment communication

Alarm name (Japanese)	Alarm name (English)	Class	Description
GPS ポート	GPS Port	Alarm	A serial driver error of the GPS port is detected.
Gyro/Compass ポート	Gyro/Compass Port	Alarm	A serial driver error of the Gyro/Compass port is detected.
NMEA1 ポート	NMEA1 Port	Alarm	A serial driver error of the NMEA1 port is detected.
NMEA2 ポート	NMEA2 Port	Alarm	A serial driver error of the NMEA2 port is detected.
Keyboard ポート	Keyboard Port	Alarm	A serial driver error of the operation unit port is detected.
Scanner ポート	Scanner Port	Alarm	A serial driver error of the scanner communication port is detected.
ジャイロ 無通信	GYRO(Time Out)	Alarm	For heading equipment=Gyro, cannot receive valid sentences (including checksum error) which had been received properly.
ログ 無通信	Log(Time Out)	Alarm	For speed equipment=log, cannot receive valid sentences (including checksum error) which had been received properly.
ジャイロ 通信データ	GYRO(Data)	Alarm	An abnormality of the gyro data connected to NSK is detected.
ログ 通信データ	Log(Data)	Alarm	An abnormality of the log data connected to NSK is detected.
針路 無通信	Heading(Time Out)	Alarm	For heading equipment=compass, cannot receive valid NMEA bearing sentences (including checksum error) which had been received properly.
針路 通信データ	Heading(Data)	Alarm	For heading equipment=compass, cannot receive valid NMEA bearing data which had been received properly.
2 軸対地 無通信	2AXG(Time Out)	Alarm	For speed equipment=2-axis log, cannot receive valid VBW sentences (including checksum error) which had been received properly.
2 軸対地 通信データ	2AXG(Data)	Alarm	For speed equipment=2-axis log, cannot receive valid VBW ground data which had been received properly.
GPS エラー	GPS(Error)	Status	Failed to set GPS.
GPS 無通信	GPS(Time Out)	Alarm	Cannot receive valid GPS sentences (including checksum error) which had been received properly.
GPS 位置データ	GPS(Position)	Alarm	Cannot receive valid position data which had been received properly
GPS 測地系データ	GPS(Datum)	Alarm	Cannot receive valid geodetic data which had been received properly
GPS 速度データ	GPS(Speed)	Alarm	For speed equipment=GPS, cannot receive valid speed data which had been received properly
GPS 測位状態	GPS(Status)	Alarm	Received GPS fixing status error (invalid) data
水深 無通信	Depth(Time Out)	Alarm	Cannot receive valid depth sentences (including checksum error) which had been received properly
水深 通信データ	Depth(Data)	Alarm	Cannot receive valid depth data which had been received properly
水温 無通信	TEMP(Time Out)	Alarm	Cannot receive valid water temperature sentences which had been received properly
水温 通信データ	TEMP(Data)	Alarm	Cannot receive valid water temperature data which had been received properly
風向風速 無通信	Wind(Time Out)	Alarm	Cannot receive valid wind direction/wind velocity sentences (including checksum error) which had been received properly
風向風速（真） 通信ﾃﾞｰﾀ	Wind True(Data)	Alarm	Cannot receive valid water temperature data after valid wind direction/wind velocity (true) data had been received properly
風向風速（相） 通信ﾃﾞｰﾀ	Wind Relative(Data)	Alarm	Cannot receive valid water temperature data after valid wind direction/wind velocity (relative) data had been received properly
回頭率 無通信	Turn(Time Out)	Alarm	Cannot receive valid turning ratio sentences (including checksum error) which had been received properly
回頭率 通信データ	Turn(Data)	Alarm	Cannot receive valid turning ratio data which had been received properly
舵角 無通信	Rudder(Time Out)	Alarm	Cannot receive valid steering direction sentences (including checksum error) which had been received properly
舵角 通信データ	Rudder(Data)	Alarm	Cannot receive valid steering direction data which had been received properly

Alarm name (Japanese)	Alarm name (English)	Class	Description
AIS 無通信	AIS(Time Out)	Alarm	For AIS function=On, cannot receive valid AIS data (including checksum error) which had been received properly
AIS 通信データ	AIS(Data)	Alarm	For AIS function=On, cannot receive valid AIS data which had been received properly
AIS ｱﾗｰﾑ 001	AIS(Alarm 001)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 002	AIS(Alarm 002)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 003	AIS(Alarm 003)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 004	AIS(Alarm 004)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 005	AIS(Alarm 005)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 006	AIS(Alarm 006)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 008	AIS(Alarm 008)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 025	AIS(Alarm 025)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 026	AIS(Alarm 026)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 029	AIS(Alarm 029)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 030	AIS(Alarm 030)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 032	AIS(Alarm 032)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)
AIS ｱﾗｰﾑ 035	AIS(Alarm 035)	Alarm	For AIS function=On, an error from the AIS receiver is received (ALR)

Table 6.2-5 Notification list

Alarm name (Japanese)	Alarm name (English)	Class	Description
ジャイロ設定	Set Gyro	Status	Requires setting of true bearing.
まもなく TM リセット	TM Reset	Status	For TM, the own ship position is out of 60% of the radius of PPI.
GPS 測位精度低下	GPS(HDOP)	Caution	Received excessive HDOP value beyond the setting.

Table 6.2-6 Radar alarm list

Alarm name (Japanese)	Alarm name (English)	Class	Description
ﾚｰﾀﾞｰｱﾗｰﾑ 1 進入	Area1(Approach)	Alarm	Echo in area 1.
ﾚｰﾀﾞｰｱﾗｰﾑ 2 進入	Area2(Approach)	Alarm	Echo in area 2.
ﾚｰﾀﾞｰｱﾗｰﾑ 1 離脱	Area1(Secession)	Alarm	No echo in area 1
ﾚｰﾀﾞｰｱﾗｰﾑ 2 離脱	Area2(Secession)	Alarm	No echo in area 2
ﾚｰﾀﾞｰｱﾗｰﾑ 1 領域外	Area1(Out of Range)	Alarm	Rectangle area 1 is out of range Creation of area 1 is out of range
ﾚｰﾀﾞｰｱﾗｰﾑ 2 領域外	Area2(Out of Range)	Alarm	Rectangle area 2 is out of range Creation of area 2 is out of range
TT 危険目標	TT(CPA/TCPA)	Alarm	TT is changed to a dangerous ship
TT 新規目標	TT(New Target)	Alarm	TT is automatically acquired
TT 目標ロスト	TT(Lost)	Alarm	TT is lost
TT 領域外	TT(Out of Range)	Alarm	TT cannot be tracked because it got out of the range currently used for acquisition.
TT 最大捕捉数	TT(Max Target)	Status	Manually acquired when the number of acquisition reached maximum
TT 最大捕捉数	TT(Max Target)	Status	New target cannot be acquired. (The number of TT target acquisition exceeded the maximum number (10 targets).)
EBL1/VRM1 領域外	EBL/VRM1(Out)	Status	The floating position of EBL1/VRM1 in the latitude/longitude floating setting is out of the radius of PPI
EBL2/VRM2 領域外	EBL/VRM2(Out)	Status	The floating position of EBL2/VRM2 in the latitude/longitude floating setting is out of the radius of PPI
平行線カーソル領域外	P-CURS(Out)	Status	The floating position of the parallel cursor in the latitude/longitude floating setting is out of the radius of PPI

Table 6.2-7 Error message list and alarm list for operations

Alarm name (Japanese)	Alarm name (English)	Class	Description
方位データ無し	No Heading Data	Status	The operation/function is not available because own heading is not available. • Operations for specifying TT acquisition/numerical display • Changing to TM • Changing to N Up/C Up
プリヒート中です	On Preheating	Status	The operation is not available because of preheating.
操作間隔が短いです	Short Interval	Status	The interval between standby and transmission is too short to perform transmission.
エラー発生中です	Error Occurring	Status	Transmission operation during prohibition of transmission caused by scanner error
最大点数です	Max Point	Status	Exceeded the maximum number of marks
ファイル無し	File Not Found	Status	File does not exists
外部メモリ無し	USB Memory Not Set	Status	USB memory does not exists
ファイル読込み失敗	File Read Error	Caution	Failed to load the file
ファイル書出し失敗	File Write Error	Caution	Failed to write the file
空容量不足	Not Enough Space	Status	Insufficient capacity
フォーマット失敗	Format Error	Caution	Failed to format
ファイル数オーバー	Num of files Over	Caution	Writing data to the USB memory in which the number of the file has reached to the maximum
ファイル削除失敗	File Erase Error	Caution	Failed to delete the file

Alarm name (Japanese)	Alarm name (English)	Class	Description
診断結果 NG	Self Test NG	Caution	Diagnosis NG
自船高緯度オーバー	LAT(Out of Bounds)	Caution	The own ship's latitude is 80 degrees or more (indicating that some functions are limited) • Displays AIS, waypoint, mark/line, own ship trail, etc. for 80 degrees or more • Input operations for 80 degrees or more (refer to "High Latitude" alarm)
設定されていません	Unsetting	Status	• Menu display operations when all soft key menu/multi control menu items are turned off • Area creation operations for alarm class=Off • EBL bearing setting while EBL is off • Floating setting while EBL/VRM is off • VRM range setting while VRM is off • Bearing/width setting while parallel cursor is off • Manual tuning setting while automatic tuning is on • AIS operations while AIS function is off • TT operations while TT function is off • Operations to display the weather information while no observation point is selected
最大レンジです	MAX Range Scale	Status	Range up operations at the maximum range
最小レンジです	MIN Range Scale	Status	Range down operations at the minimum range
無効値です	Invalid Data	Status	The operation/function is not available because of invalid value. • Invalid code is input for the code input screen
操作中です	In Operation	Status	This operation is disabled due to another operation • Setting enable/disable and class during alarm area creation • Setting operations for on/off and floating position during EBL bearing setting • Setting operations for on/off and bearing during EBL floating position setting • Operations for on/off during VRM range setting • Operations for on/off, mode and saving during off center custom position setting • Operations for PRF tuning during manual tuning operations • Setting for automatic/manual mode during manual tuning operations • Operations for manual tuning during PRF tuning operation
方位/緯度経度 無し	No HDG/POSN Data	Status	Cursor operations when own heading or latitude/longitude is disabled • MOB input • Event mark input • Inputting/erasing/moving marks • Inputting/erasing/moving/inserting lines • Floating position setting for EBL latitude/longitude. • Floating position setting for VRM latitude/longitude. • Floating position setting for parallel cursor latitude/longitude • AIS numerical display/destination ship/retrieved vessel selection • Creating latitude/longitude alarm area. • TLL transmission for cursor.

Alarm name (Japanese)	Alarm name (English)	Class	Description
できません	Not Allowed	Status	• Operations for inserting by selecting the end point in the line list. • Operations for switching to H-UP during TM (When heading is not available, temporarily changed to RM-HUp, therefore, message is disabled.)
設定不可なレンジです	Range Scale Limit	Status	Operations functionally restricted for certain range. • Zoom operations in range where zoom is not available. • Off center operations in range where off center is not available. • TM setting operations in range where TM setting is not available.
データがありません	No Valid Data	Status	Operations without data. • Displaying history menu without history data. • Operations for editing/erasing in the mark list while there is no mark. • Operations for editing/erasing/inserting in the line list while there is no line.
スタンバイ中です	Scanner Standby	Status	The functions which are available only during transmitting are operated during standby (or preheating). • Setting Timed TX to on. Cursor operations during standby (no graphic display is available). • Custom position setting for off center. • Inputting/erasing/moving marks • Inputting/erasing/moving/inserting lines • Floating position setting for EBL. • Floating position setting for VRM. • Floating position setting for parallel cursor. • TT acquisition/release/numerical display selection. • AIS numerical display/destination ship/retrieved vessel selection • Alarm area creation
高緯度オーバー	High Latitude	Status	Operations for the position of latitude 80 degrees or more. • MOB input • Event mark input • Inputting/moving marks • Inputting/moving/inserting lines • Floating position setting for EBL latitude/longitude. • Floating position setting for VRM latitude/longitude. • Floating position setting for parallel cursor latitude/longitude. • Creating latitude/longitude alarm area.
無効なバージョンです	Invalid Version	Status	Program is loading a file with an incompatible version. • Internal Setting • Marks/lines • Own track • Option languages • STC curve • Color
Flash ROM 異常	Flash ROM Error	Alarm	Initialization error of flash ROM file system during startup.
USB 異常	USB Error	Alarm	Initialization error of USB during startup.

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6.3 Examples of Trouble

6.3.1 Internal Circuits

The radar display flickers on and off	
Description The radar is operating normally, but the radar display appears and disappears at intervals.	
Location of cause →	**Procedure**
Connection	A connector may not be connected correctly. Check that the following connectors are connected correctly. • CDC-1346BR J4 • CMH-2235 J501, J502, J504
Input voltage	The input voltage may be too low. Check the voltage.

The power cannot be turned on.	
Description Pressing the power switch does not start the equipment.	
Location of cause →	**Procedure**
Fuse	Check if the fuse is blown out.
Input voltage	The protection circuit may be activated because the input voltage is too high or too low. (Voltage protection setting: 9.4 V or less, 42 V or more.) Check the voltage.

The cursor cannot be operated.	
Description The cursor cannot be moved.	
Location of cause →	**Procedure**
Connecting	A connector may not be connected correctly. Check that the following connectors are connected correctly. • CBD-1346BR J3 • CCK-991 J602,600 • CMH-2235 J503

Lines you have not entered are displayed.	
Description Lines you have not entered are shown on the radar display.	
Location of cause →	**Procedure**
Destination ship	The destination ship may be set. If it is set, release the setting. For details, refer to the instruction manual.
MOB	The MOB may be set. If it is set, release the setting. For details, refer to the instruction manual.
Destination	A destination may be set. Check if a destination is set, and clear the destination setting if so.

The initial acquisition mark is not displayed.	
Description A target is selected, but the initial acquisition mark is not displayed.	
Location of cause →	**Procedure**
Bearing input	Bearing, such as the GPS compass, may not be input. Check the bearing display on the top of the screen. If the bearing is not being input, adjust to input the bearing.

6.3.2 External Equipment

Connection cannot be established with external equipment for NMEA output.	
Description The following may cause this trouble: connection polarity, baud rate setting, setting for using external navigator, or output-equipment fan failure.	
Location of cause →	**Procedure**
Polarity	If the connection is correct, the output is LOW at the time of no signal when viewed with the negative side as reference on the oscilloscope.
Baud rate	Adjust the baud rate to the value defined in the output specifications for the navigator. Also, set the baud rate to AUTO in the menu.
Output-equipment fan failure	Check that multiple devices are not connected to the same port on the external equipment. Signals may not arrive correctly because the output capacity of the external equipment is exceeded. Follow the external equipment specifications.

Chapter 7 Drawings

7.1 Outline Drawings

Figure 7.1-1 Outline Drawing of the Scanner Unit NKE-2042

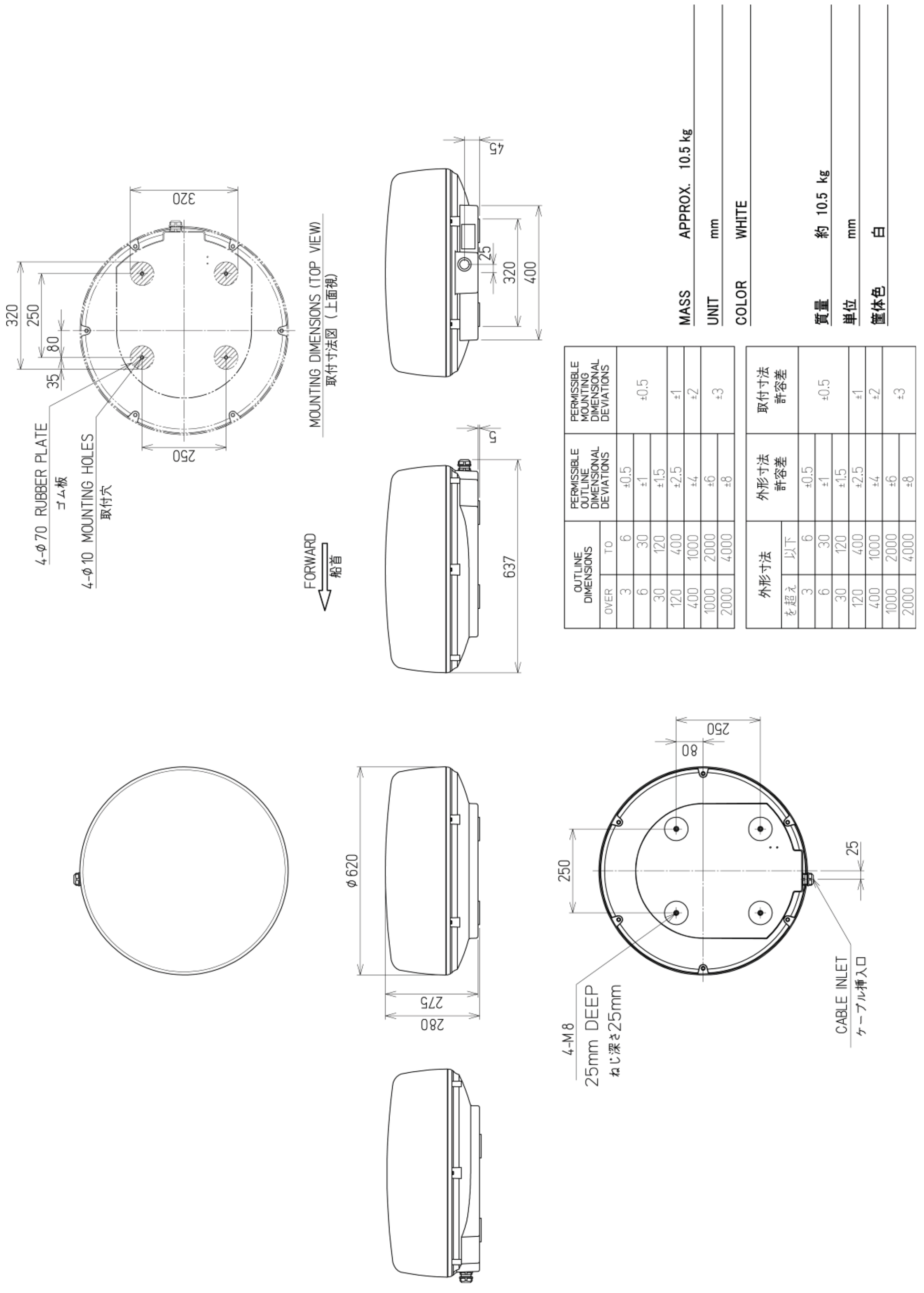
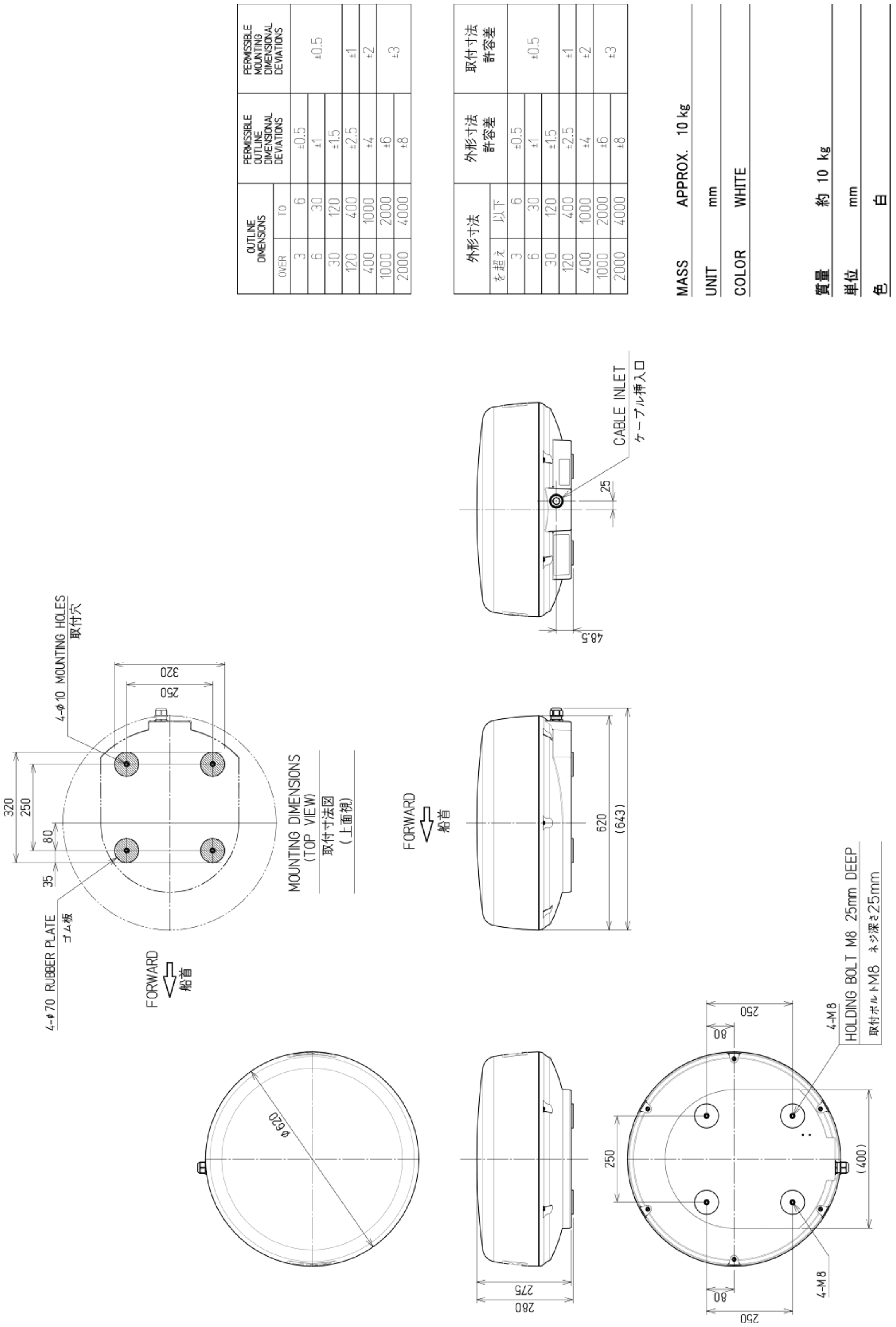


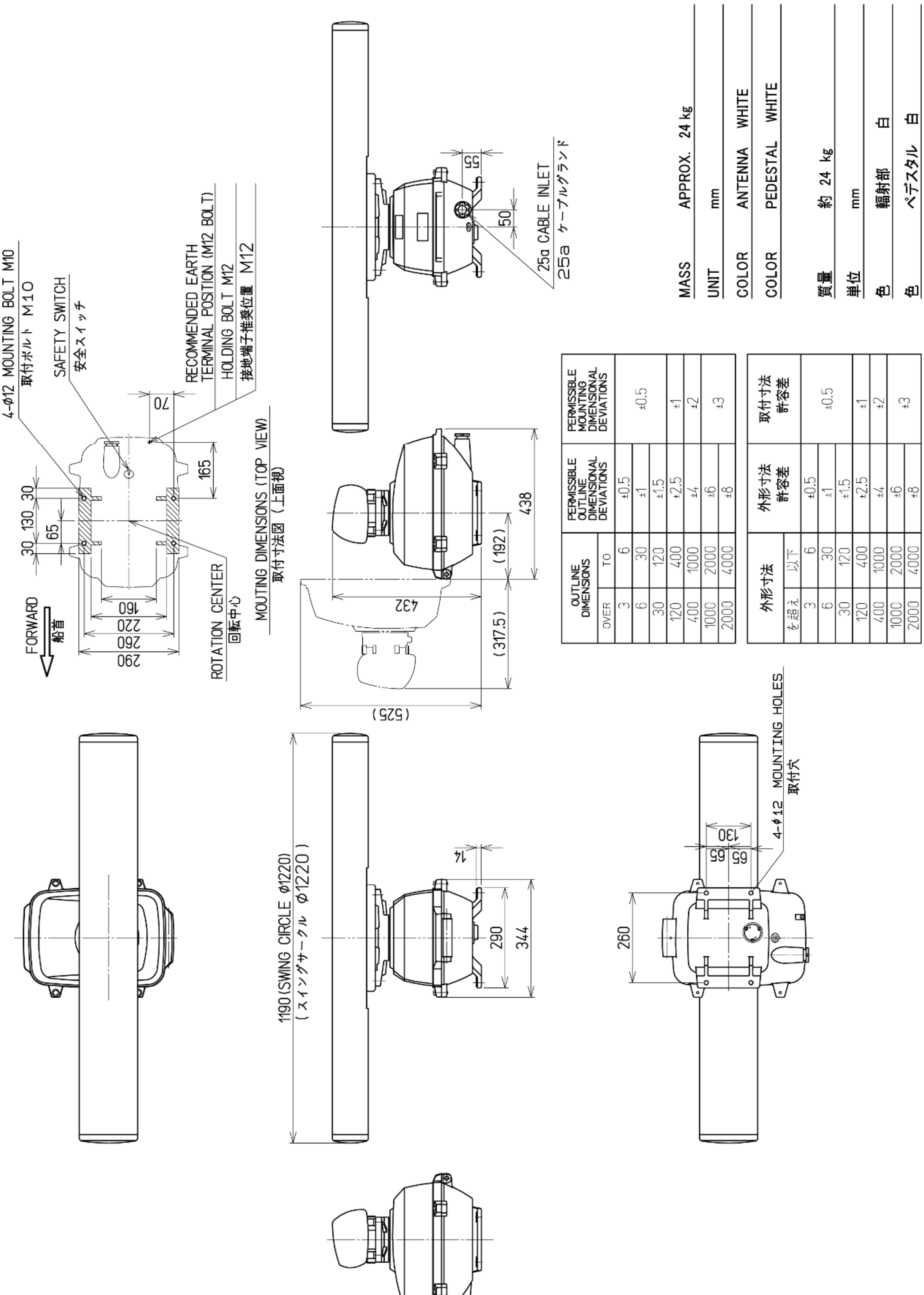
Figure 7.1-2 Outline Drawing of the Scanner Unit NKE-2043



OUTLINE DIMENSIONS OVER	TO	PERMISSIBLE OUTLINE DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

外形寸法 を超え	以下	外形寸法許容差	取付寸法許容差
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

Figure 7.1-3 Outline Drawing of the Scanner Unit NKE-2062/HS



OUTLINE DIMENSIONS OVER	OUTLINE DIMENSIONS TO	PERMISSIBLE OUTLINE DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

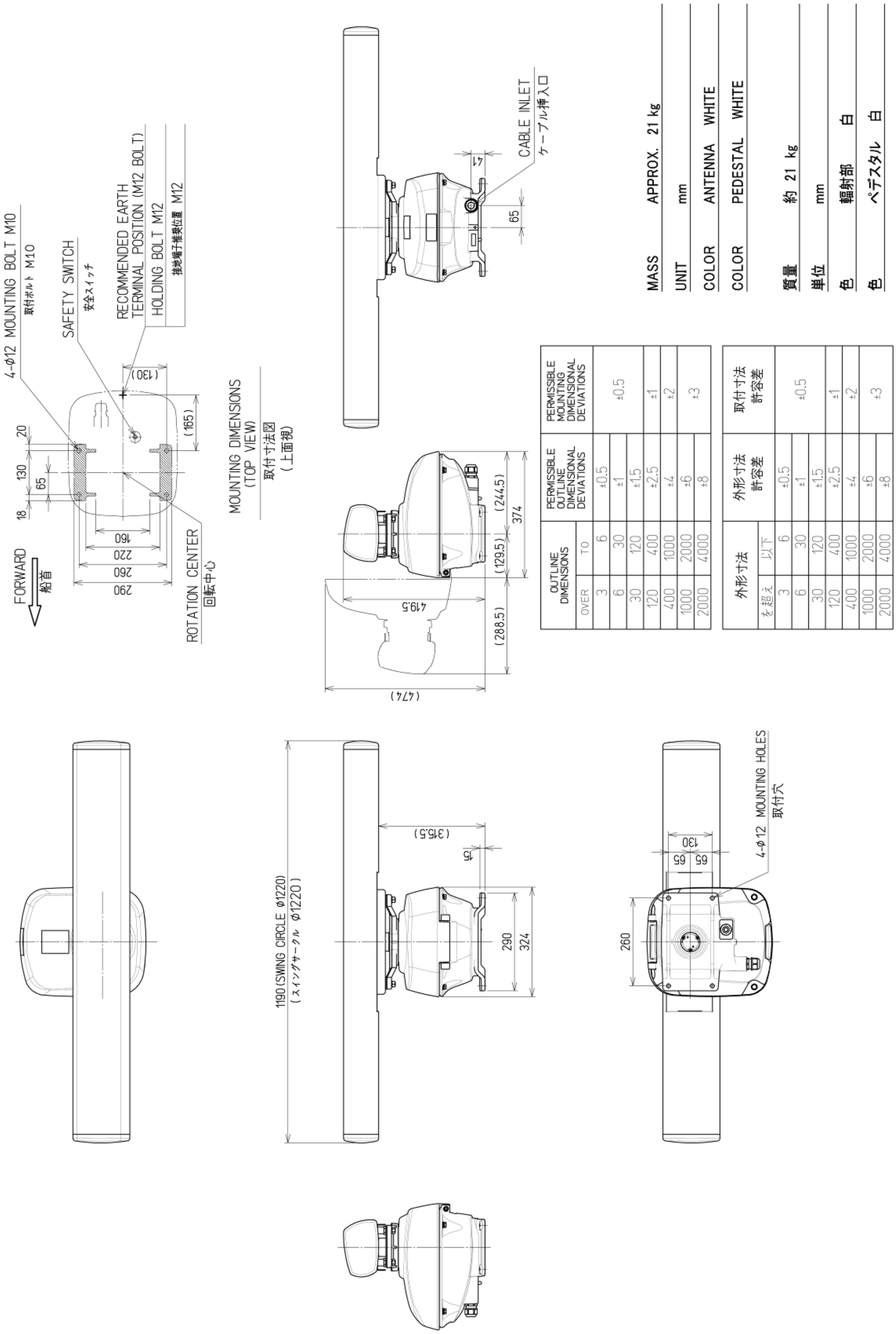
外形寸法 を超え	外形寸法 以下	外形寸法許容差	取付寸法許容差
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

MASS		APPROX. 24 kg
UNIT		mm
COLOR	ANTENNA	WHITE
COLOR	PEDESTAL	WHITE
質量		約 24 kg
単位		mm
色	輻射部	白
色	ペデスタル	白

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Figure 7.1-4 Outline Drawing of the Scanner Unit NKE-2063

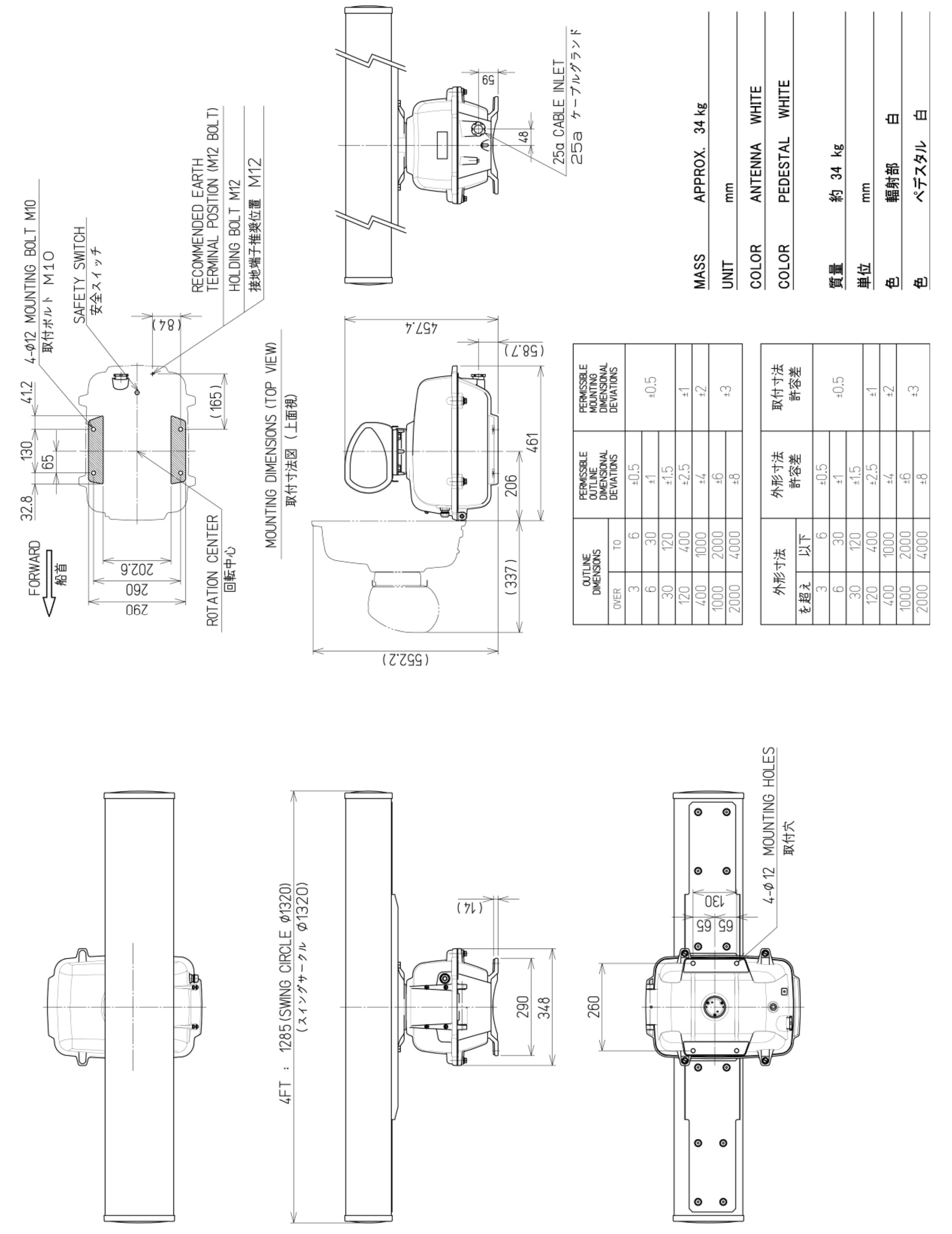


OUTLINE DIMENSIONS OVER	OUTLINE DIMENSIONS TO	PERMISSIBLE OUTLINE DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

外形寸法 を超え	外形寸法 以下	外形寸法許容差	取付寸法許容差
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

MASS	APPROX. 21 kg	
UNIT	mm	
COLOR	ANTENNA	WHITE
COLOR	PEDESTAL	WHITE
質量	約 21 kg	
単位	mm	
色	輻射部	白
色	ペデスタル	白

Figure 7.1-5 Outline Drawing of the Scanner Unit NKE-2103-4/4HS



OUTLINE DIMENSIONS OVER	TO	PERMISSIBLE OUTLINE DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

外形寸法 を超え	以下	外形寸法許容差	取付寸法許容差
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

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Figure 7.1-6 Outline Drawing of the Scanner Unit NKE-2103-6/6HS

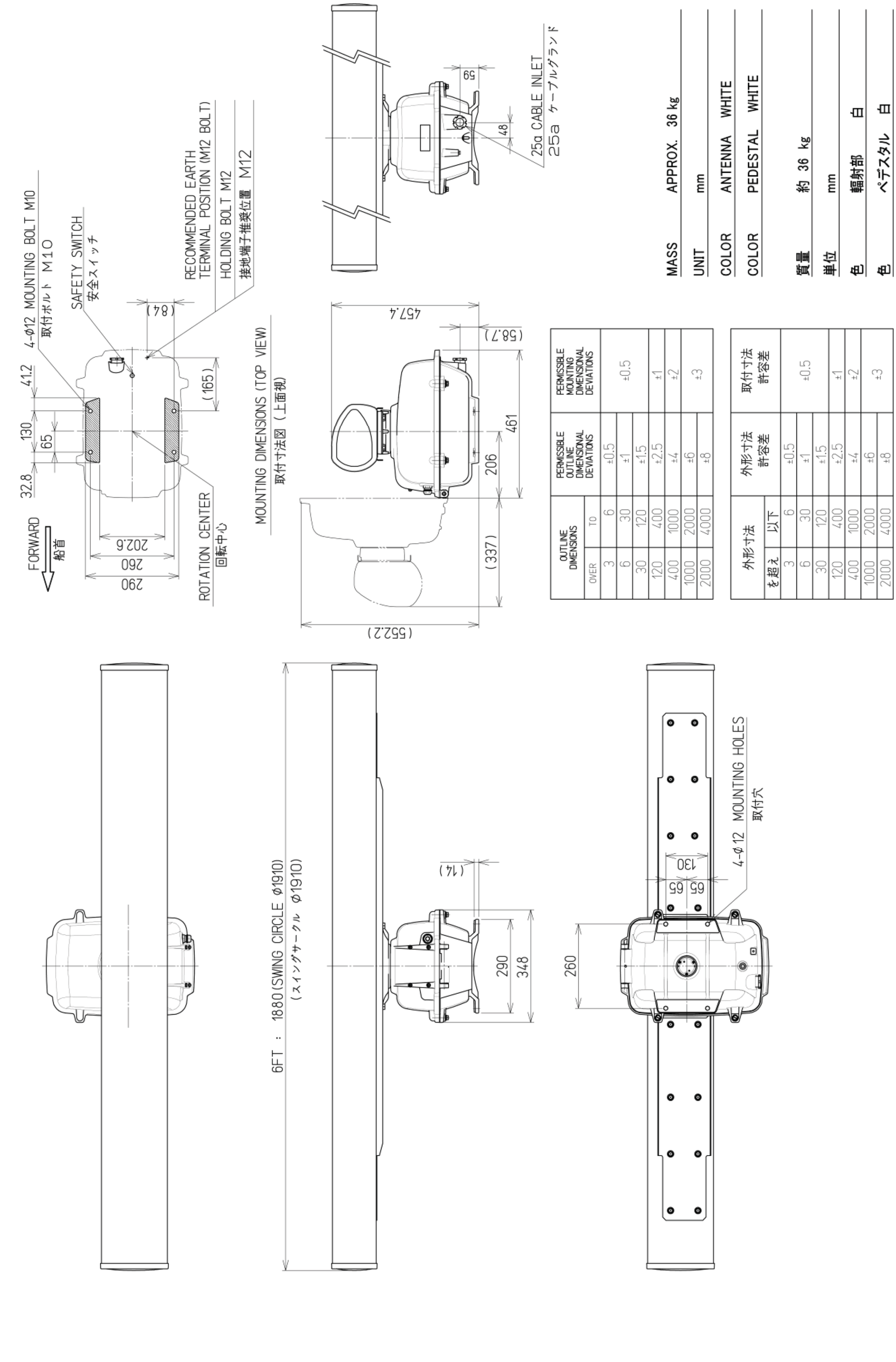
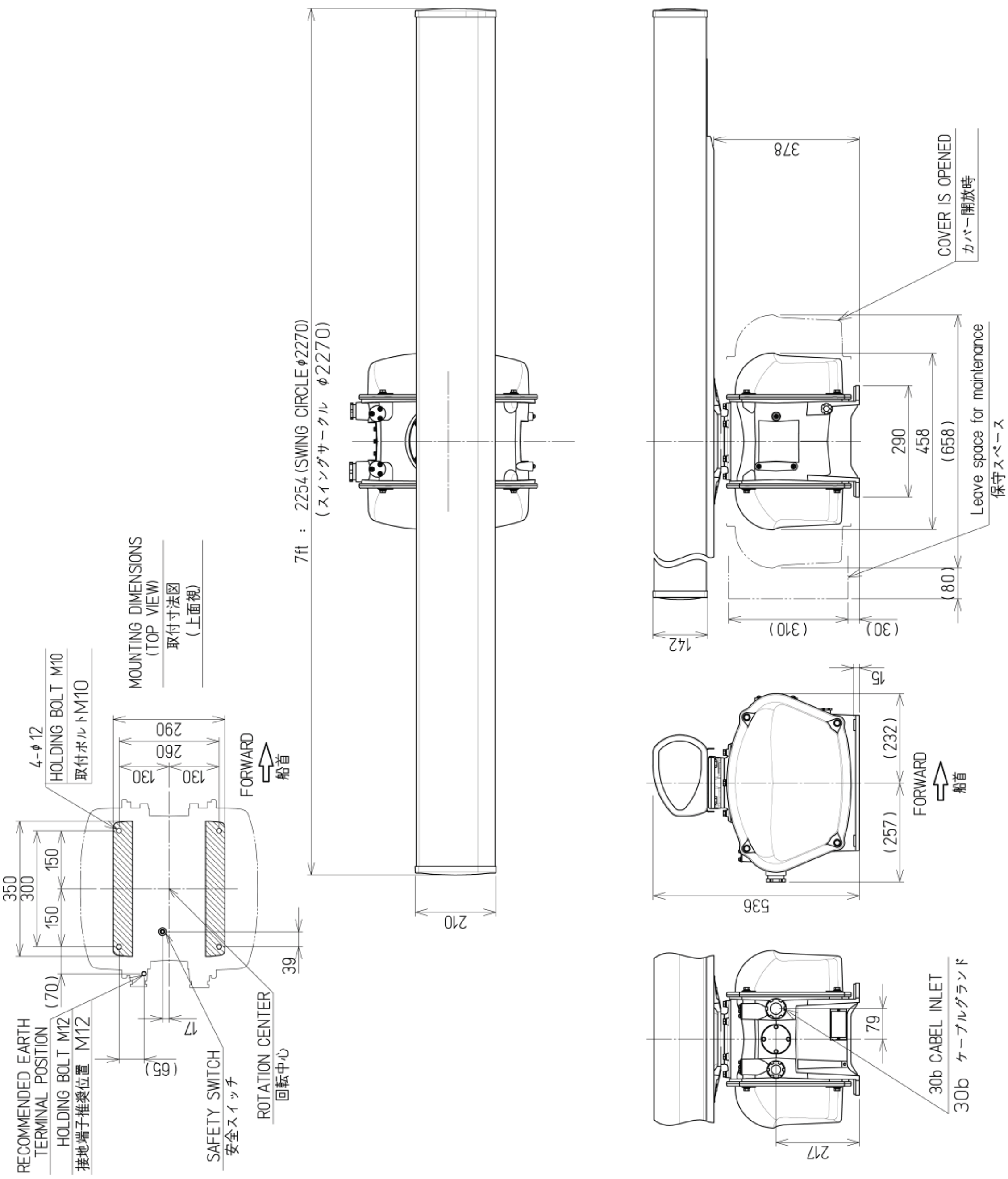


Figure 7.1-7 Outline Drawing of the Scanner Unit NKE-2254-7

OUTLINE DIMENSIONS OVER	OUTLINE DIMENSIONS TO	PERMISSIBLE OUTLINE DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

外形寸法 を超え	外形寸法 以下	外形寸法許容差	取付寸法許容差
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

MASS	APPROX. 58 kg
UNIT	mm
COLOR	ANTENNA WHITE
COLOR	PEDESTAL WHITE
質量	約 58 kg
単位	mm
色	輻射部 白
色	ペデスタル 白



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Figure 7.1-8 Outline Drawing of the Scanner Unit NKE-2254-9

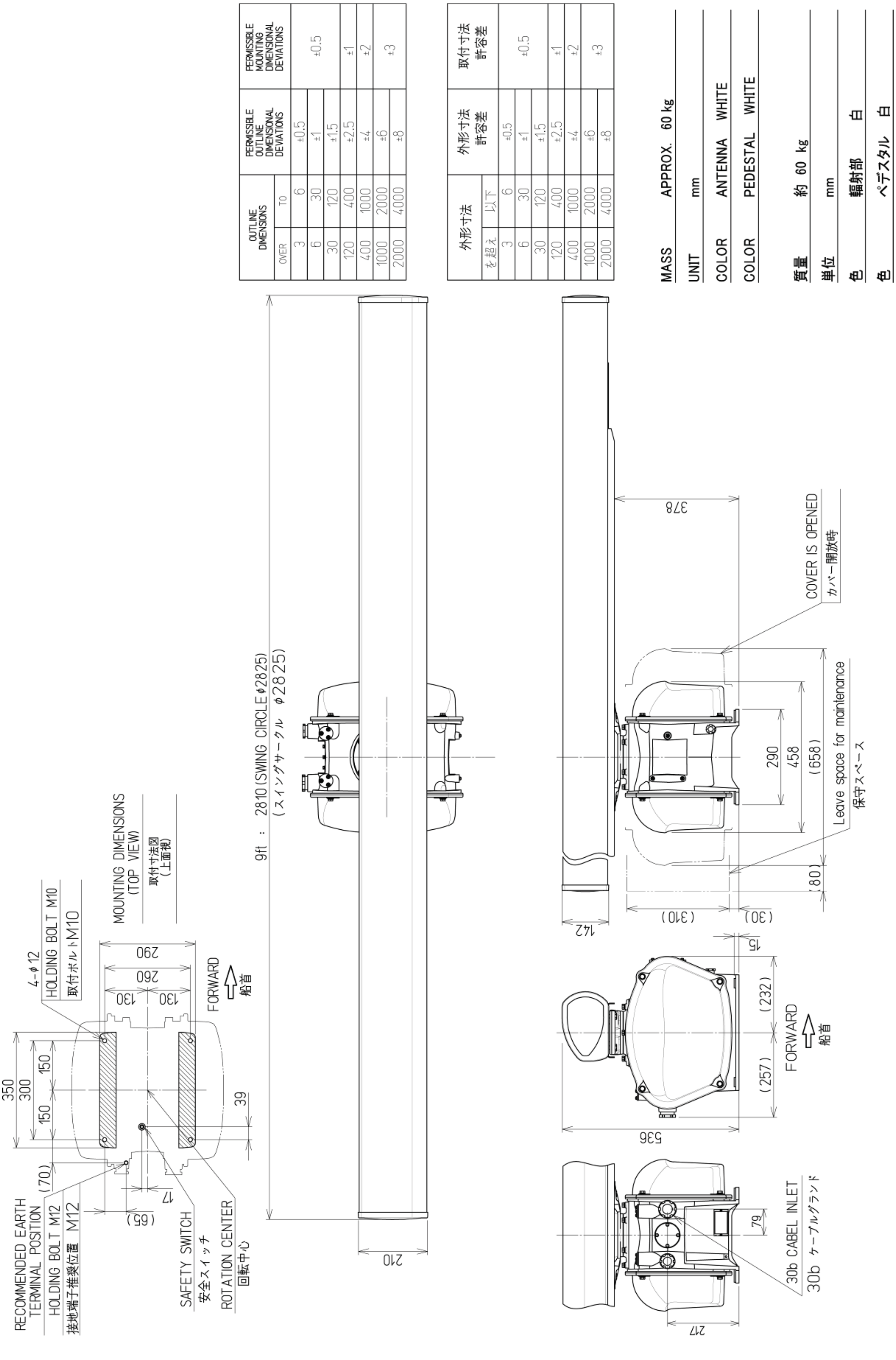


Figure 7.1-9 Outline Drawing of the Display Unit NCD-2182

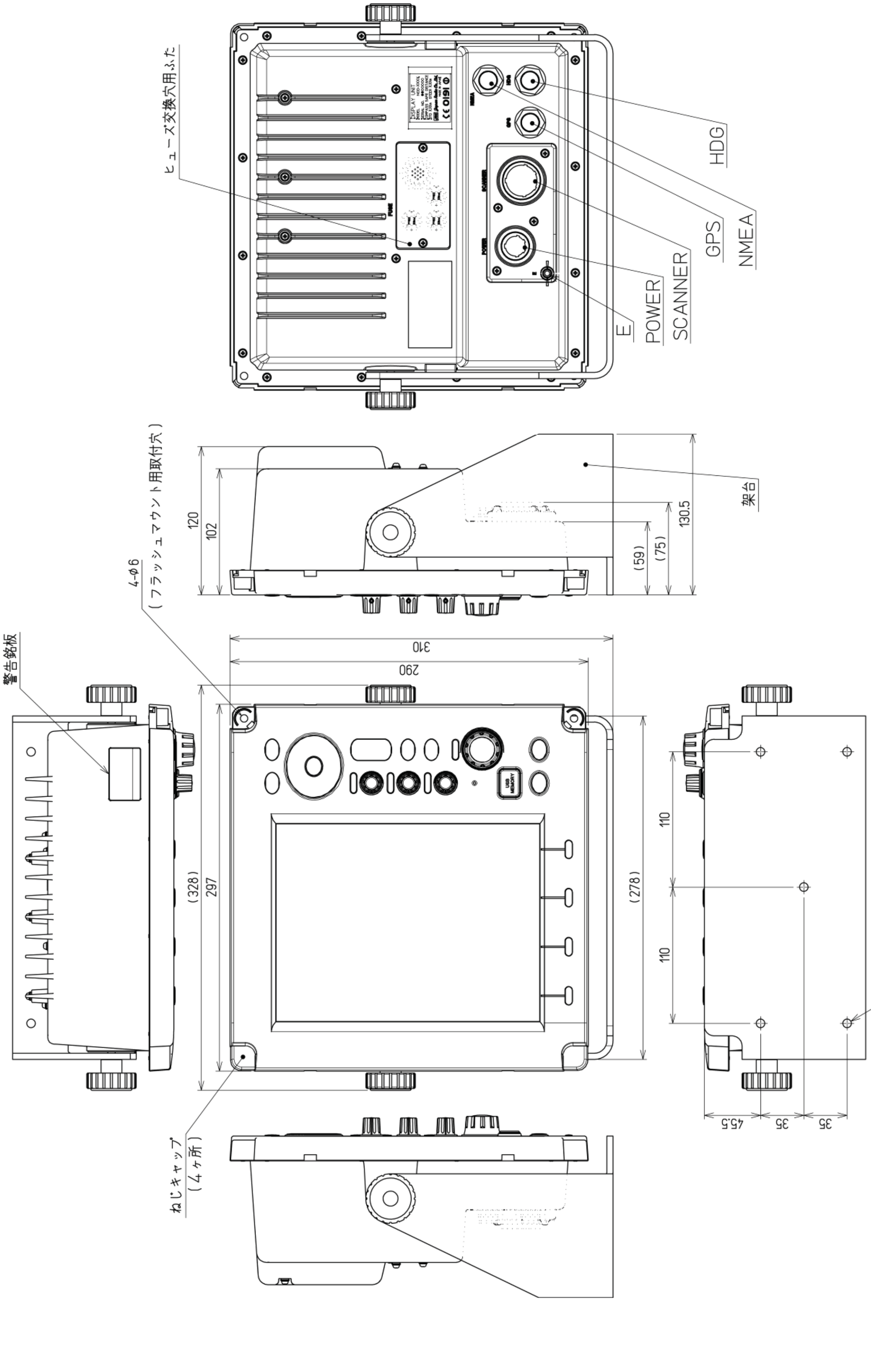


Figure 7.1-10 Outline Drawing of the Rectifier NBA-5111 (Option)

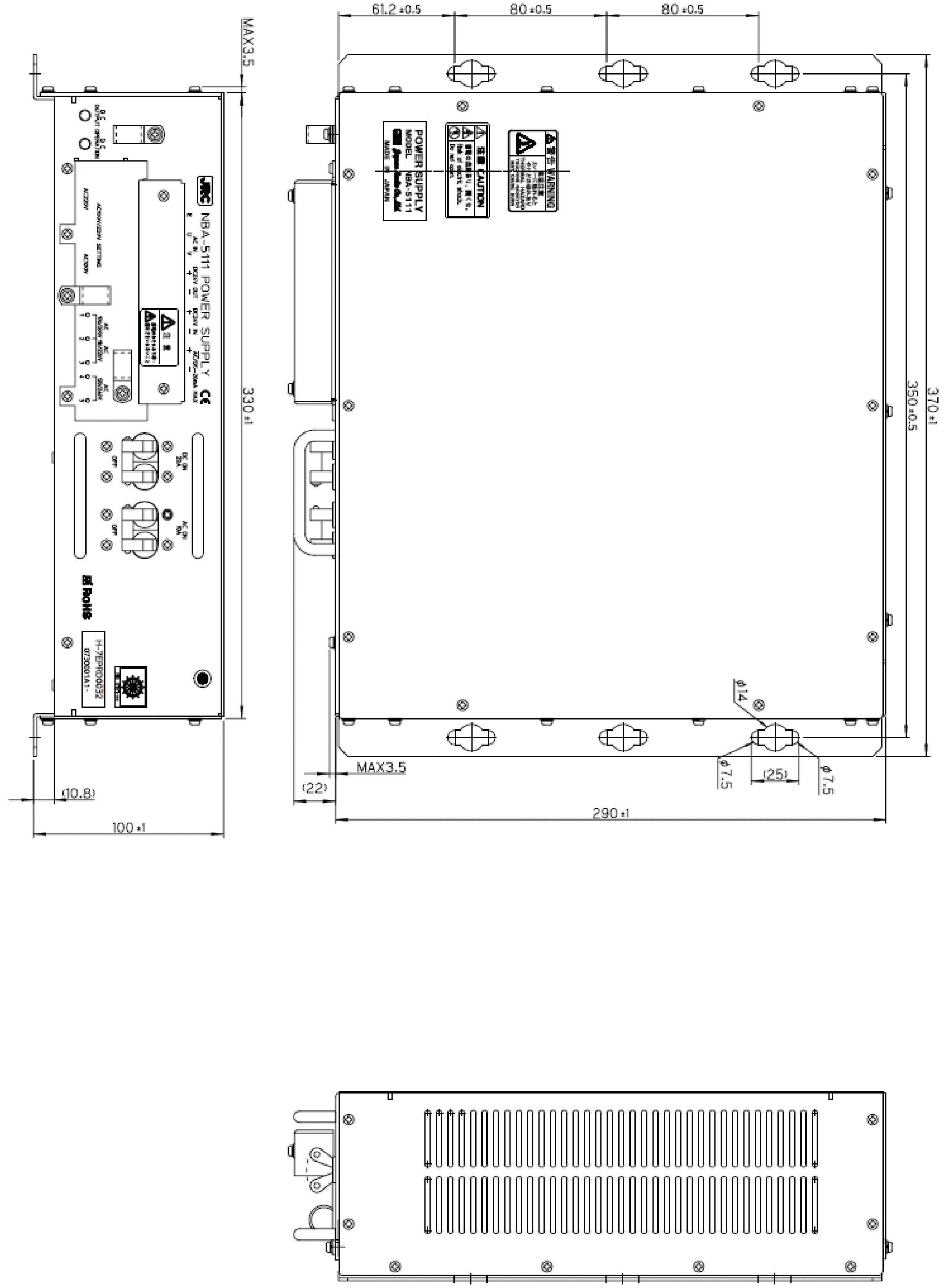
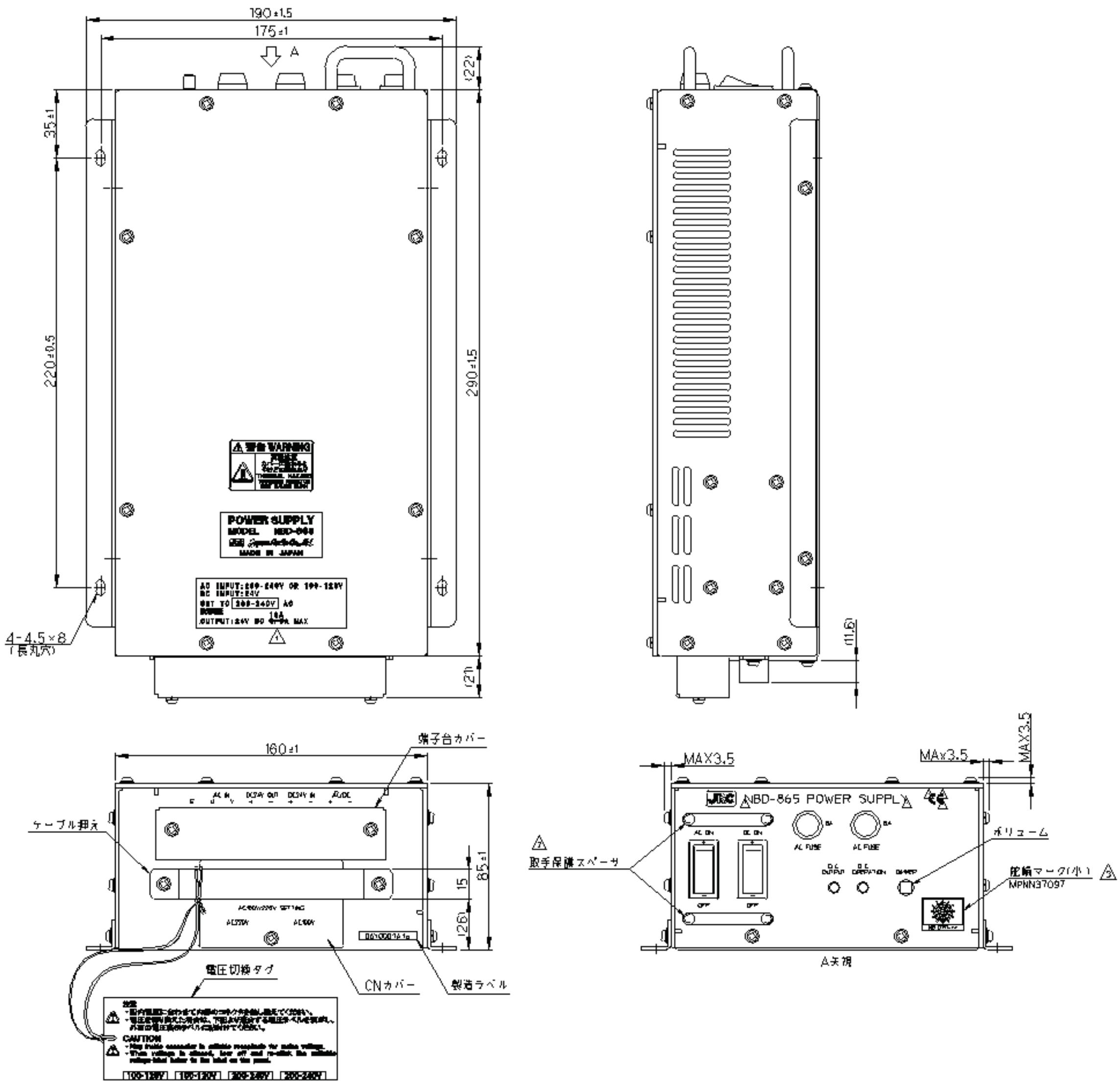
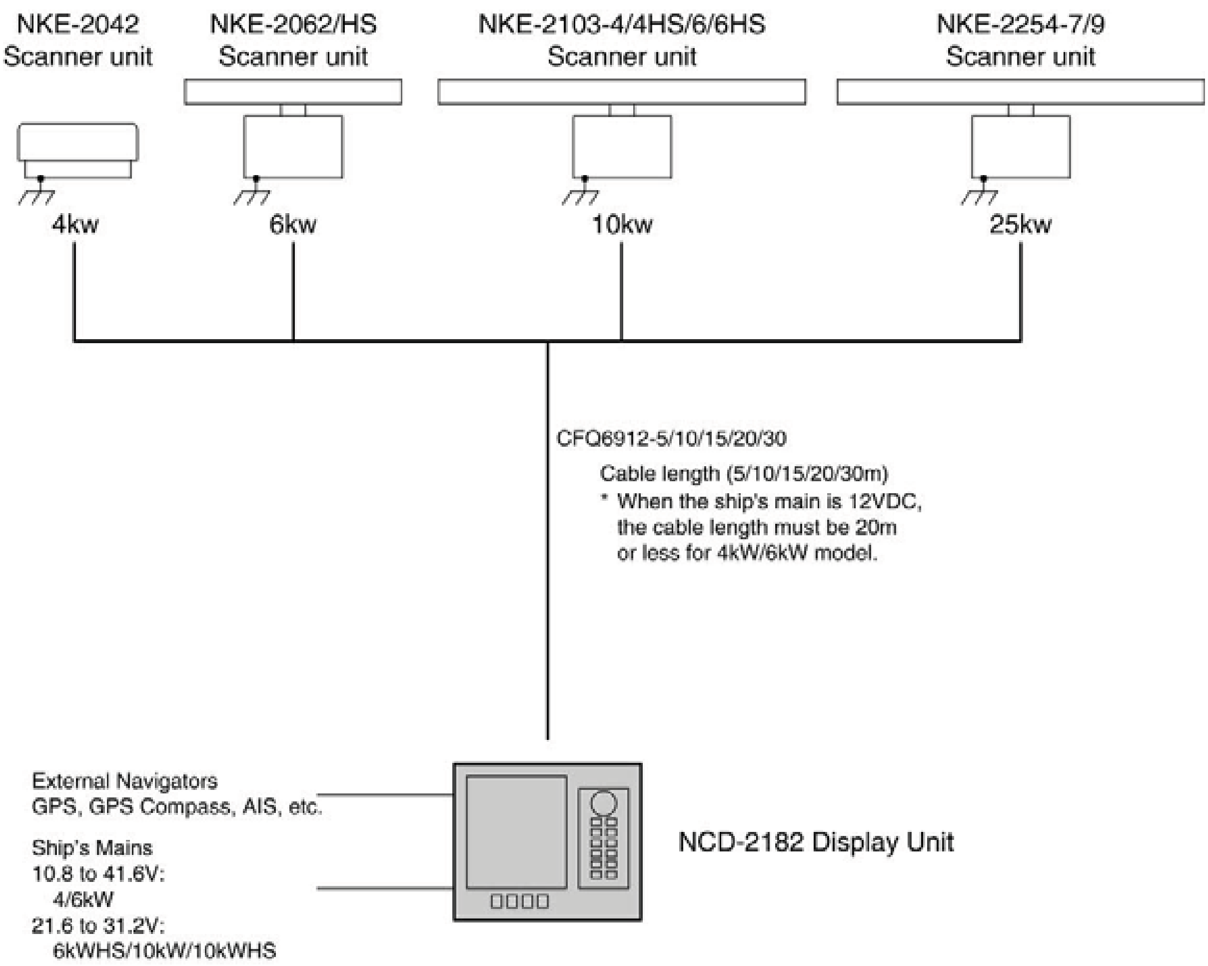


Figure 7.1-11 Outline Drawing of the Rectifier NBD-865 (Option)



7.2 System Diagrams

Figure 7.2-1 Overall System Diagram of the Radar



7.3 Inter-Unit Connection Diagram

Figure 7.3-1 Inter-Unit Connection Diagram of the JMA-3314

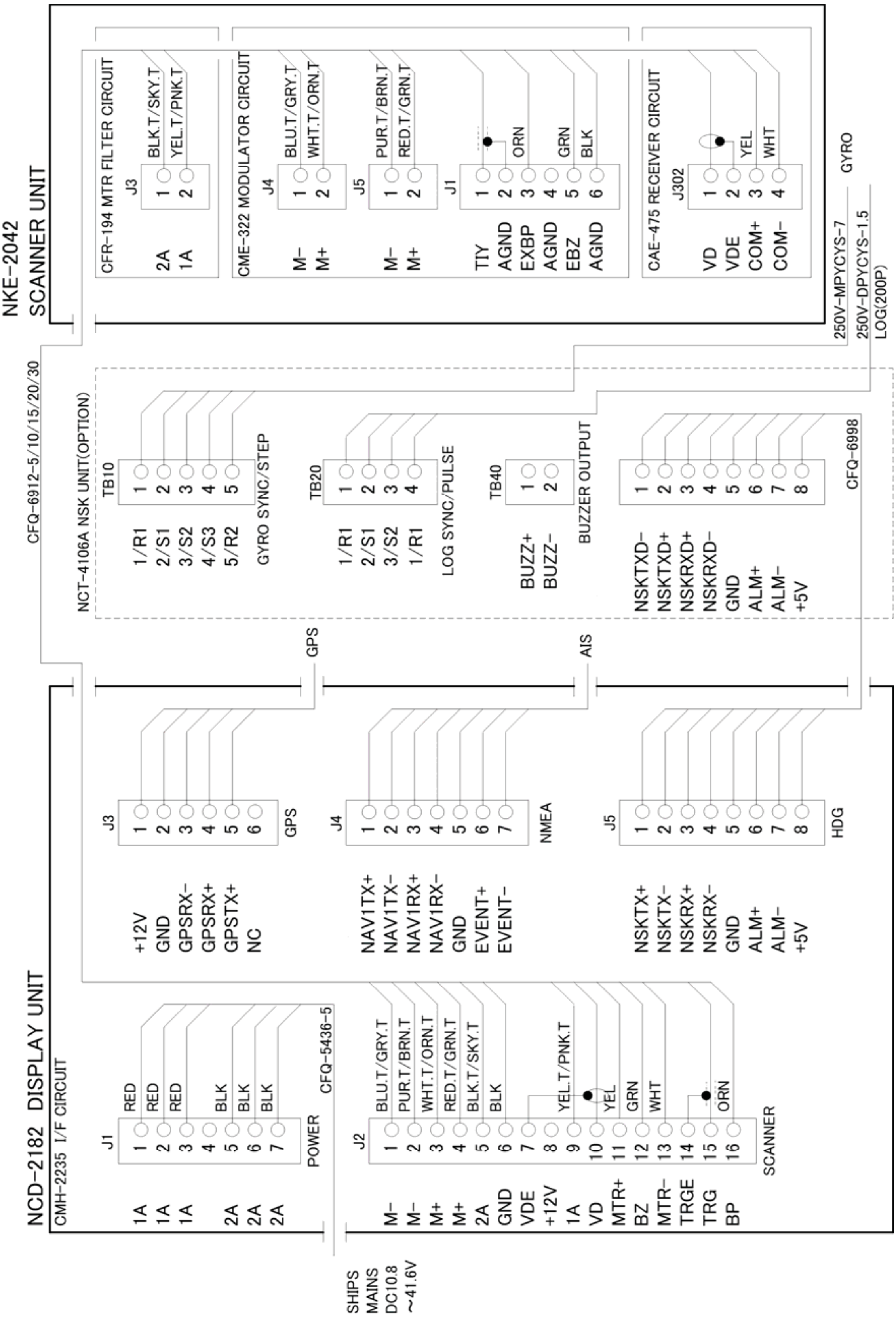


Figure 7.3-2 Inter-Unit Connection Diagram of the JMA-3334

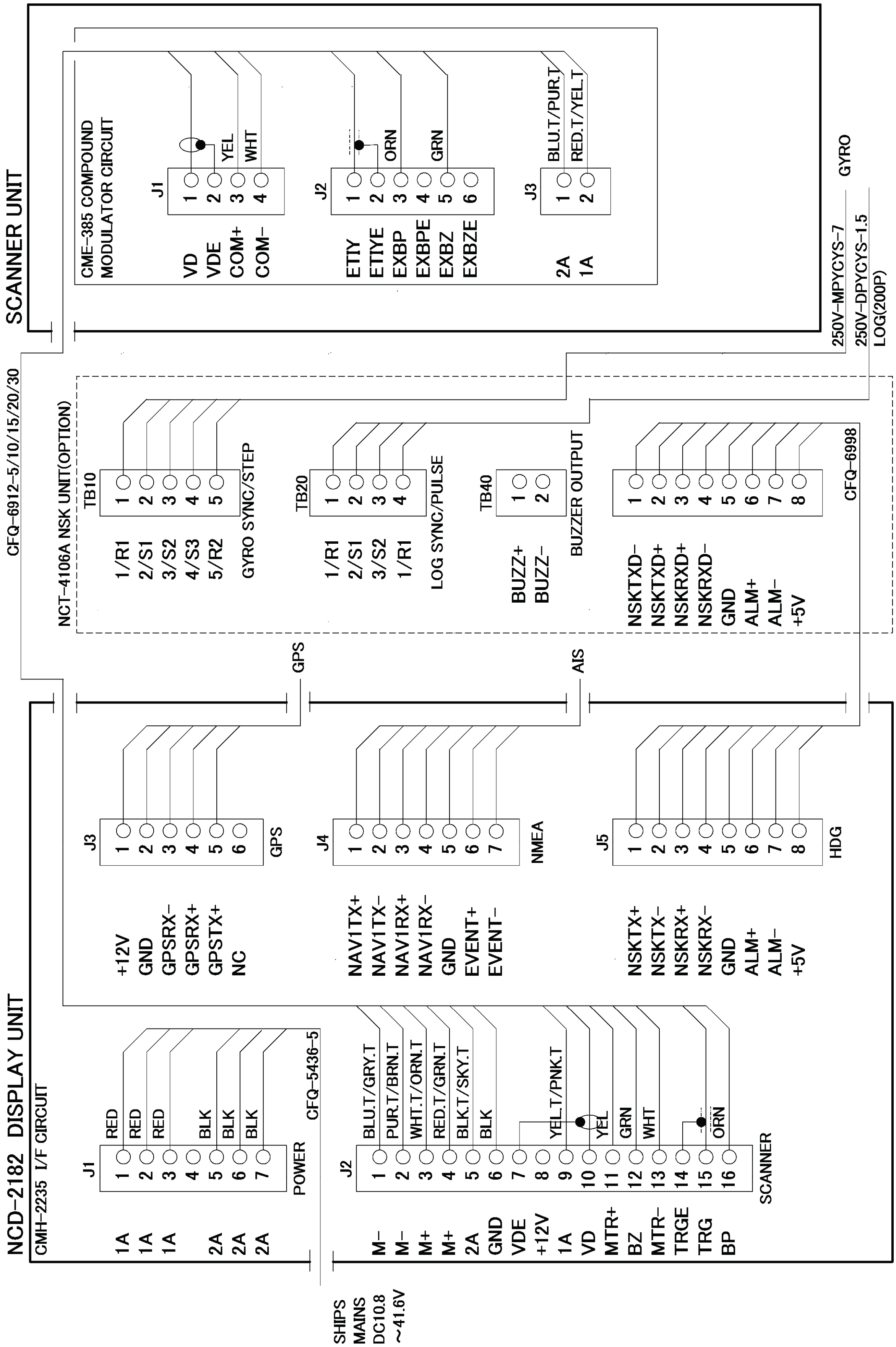


Figure 7.3-3 Inter-Unit Connection Diagram of the JMA-3316/HS

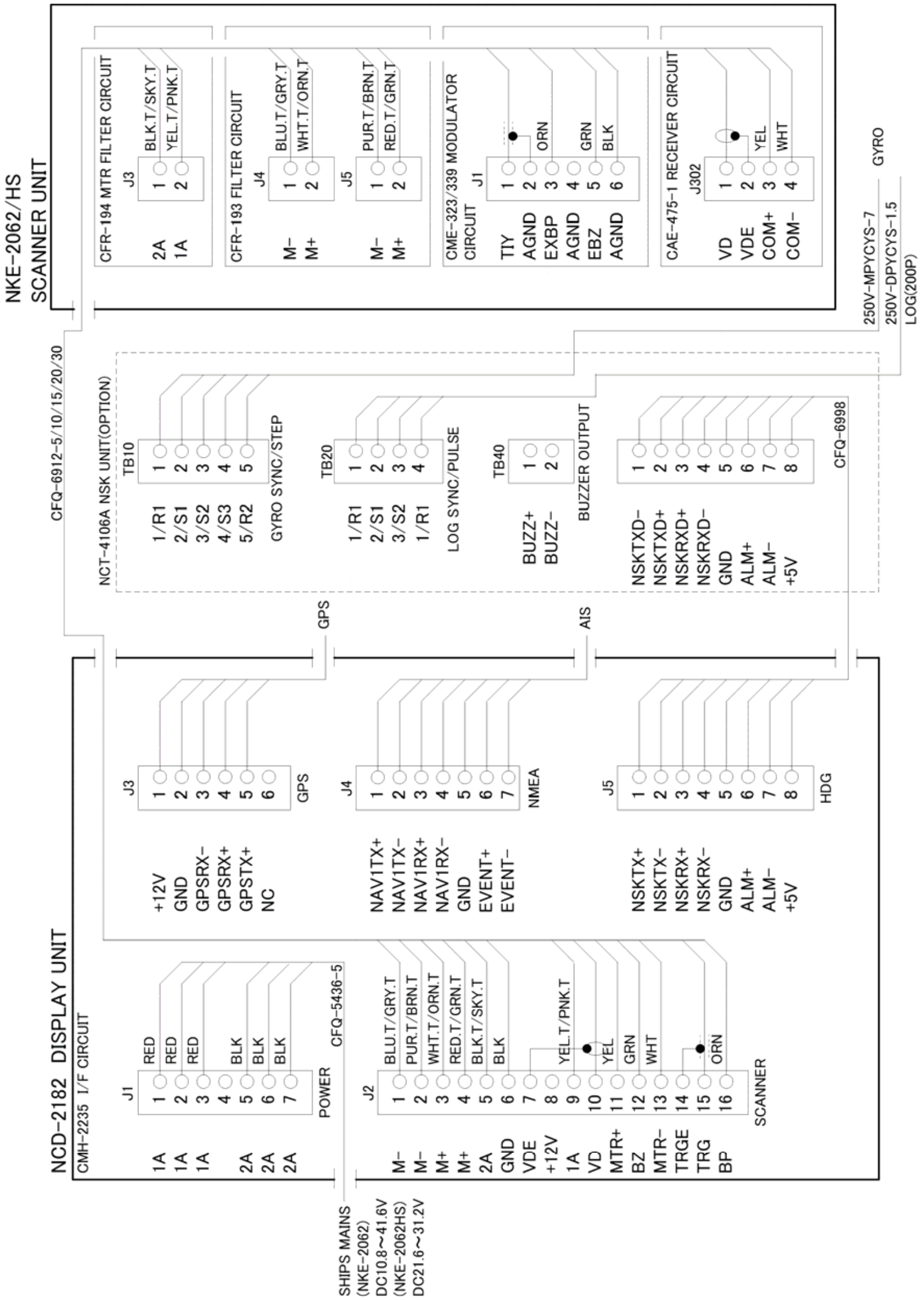


Figure 7.3-4 Inter-Unit Connection Diagram of the JMA-3336

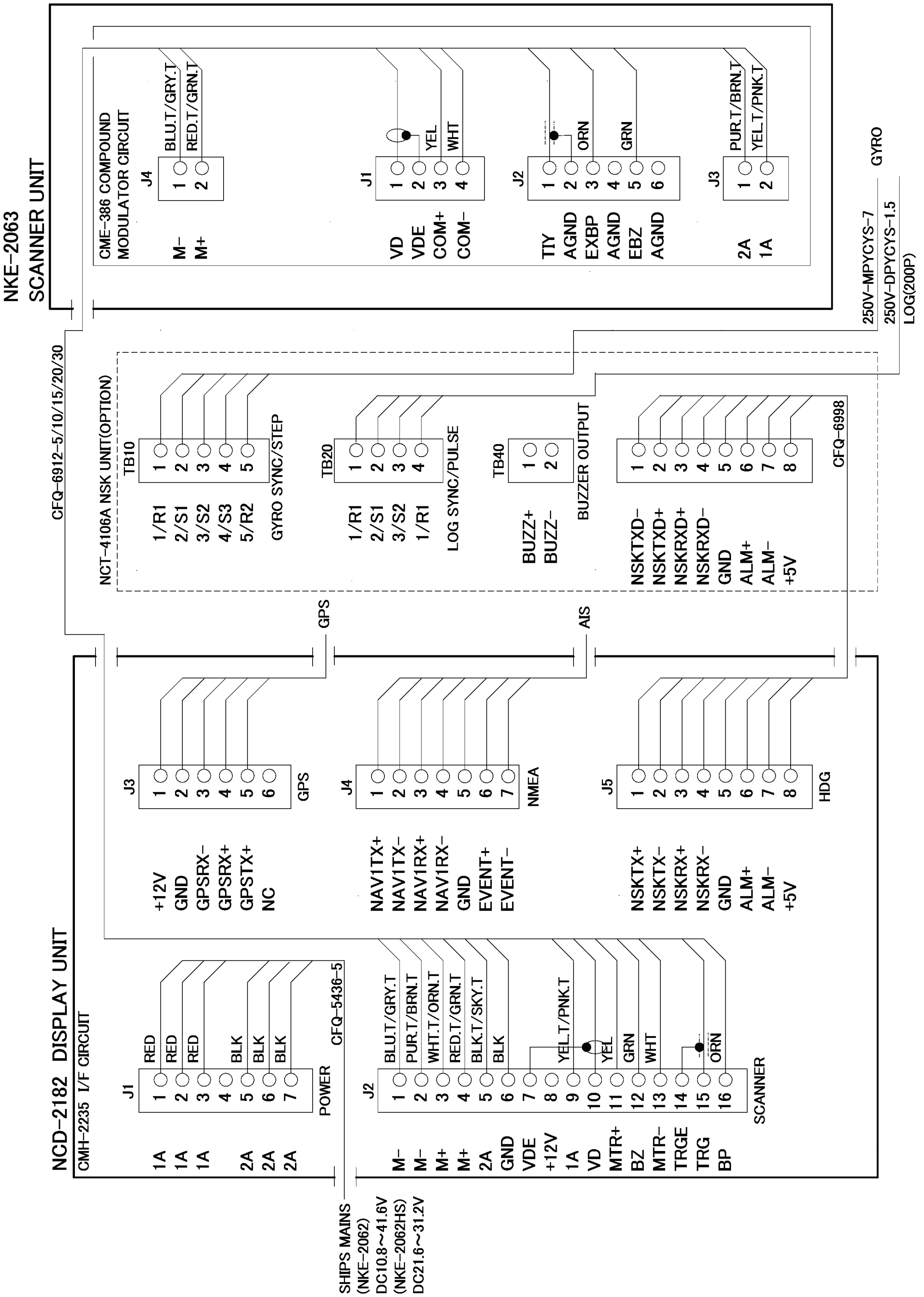


Figure 7.3-5 Inter-Unit Connection Diagram of the JMA-3340-4/4HS/6/6HS

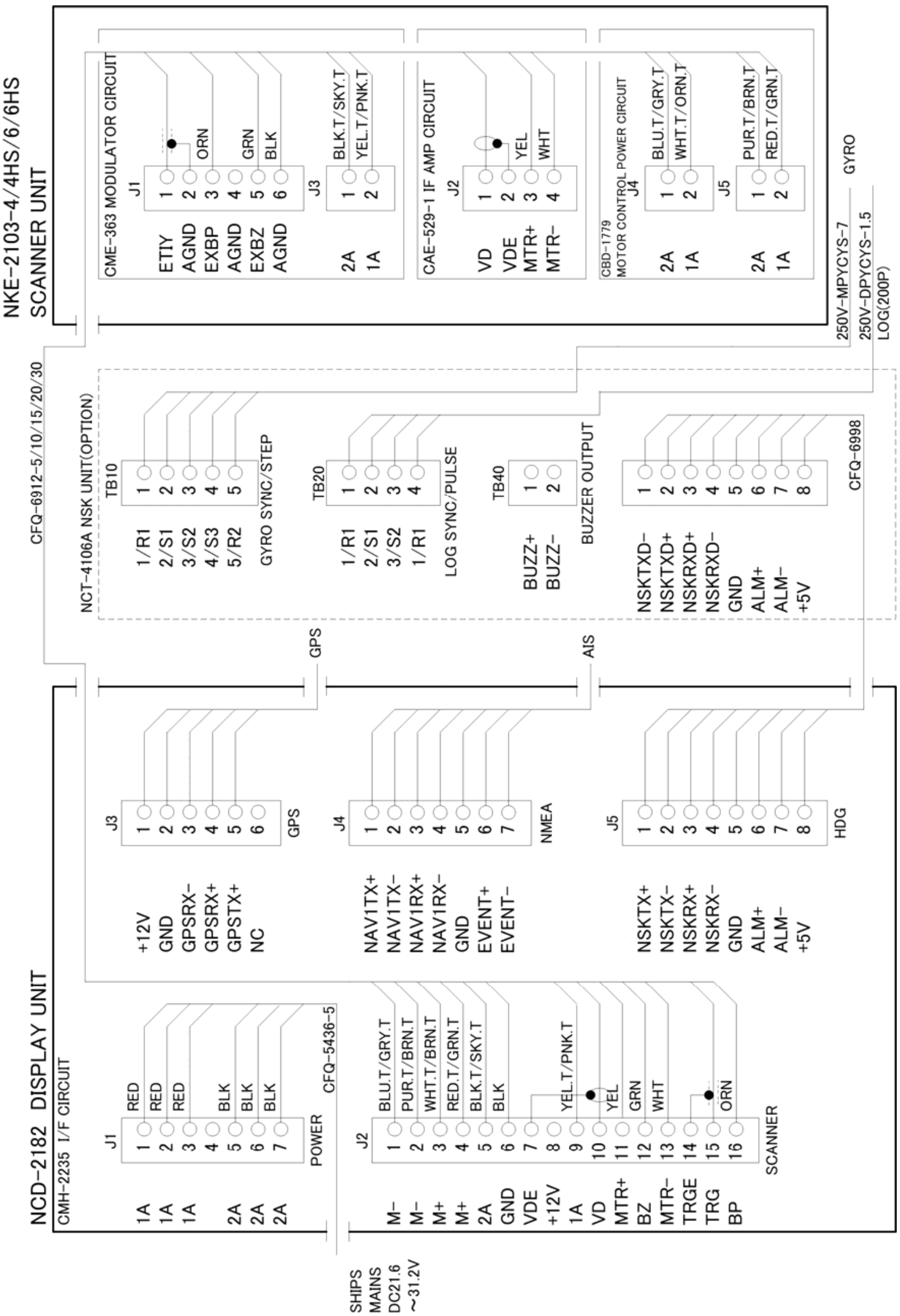
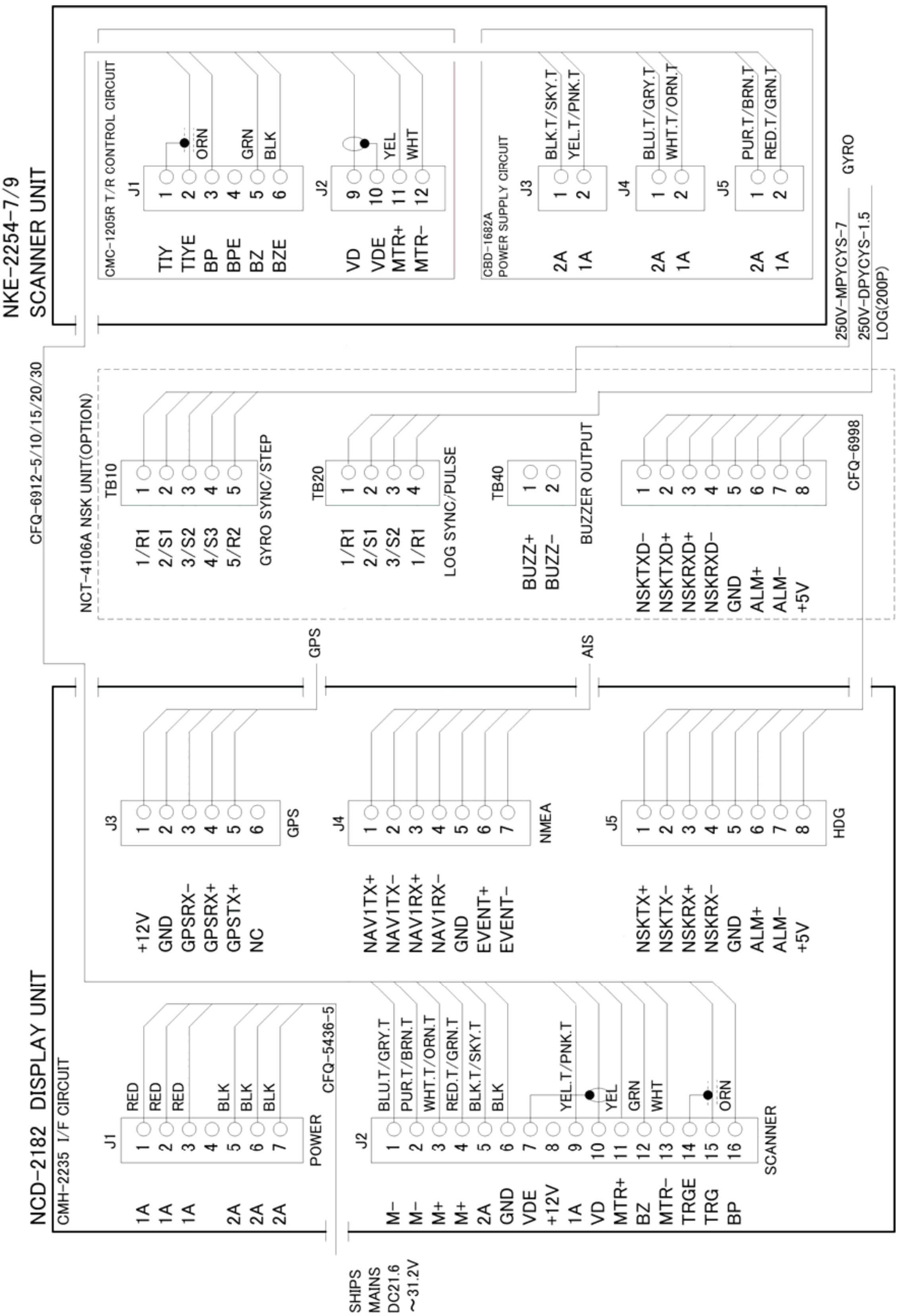
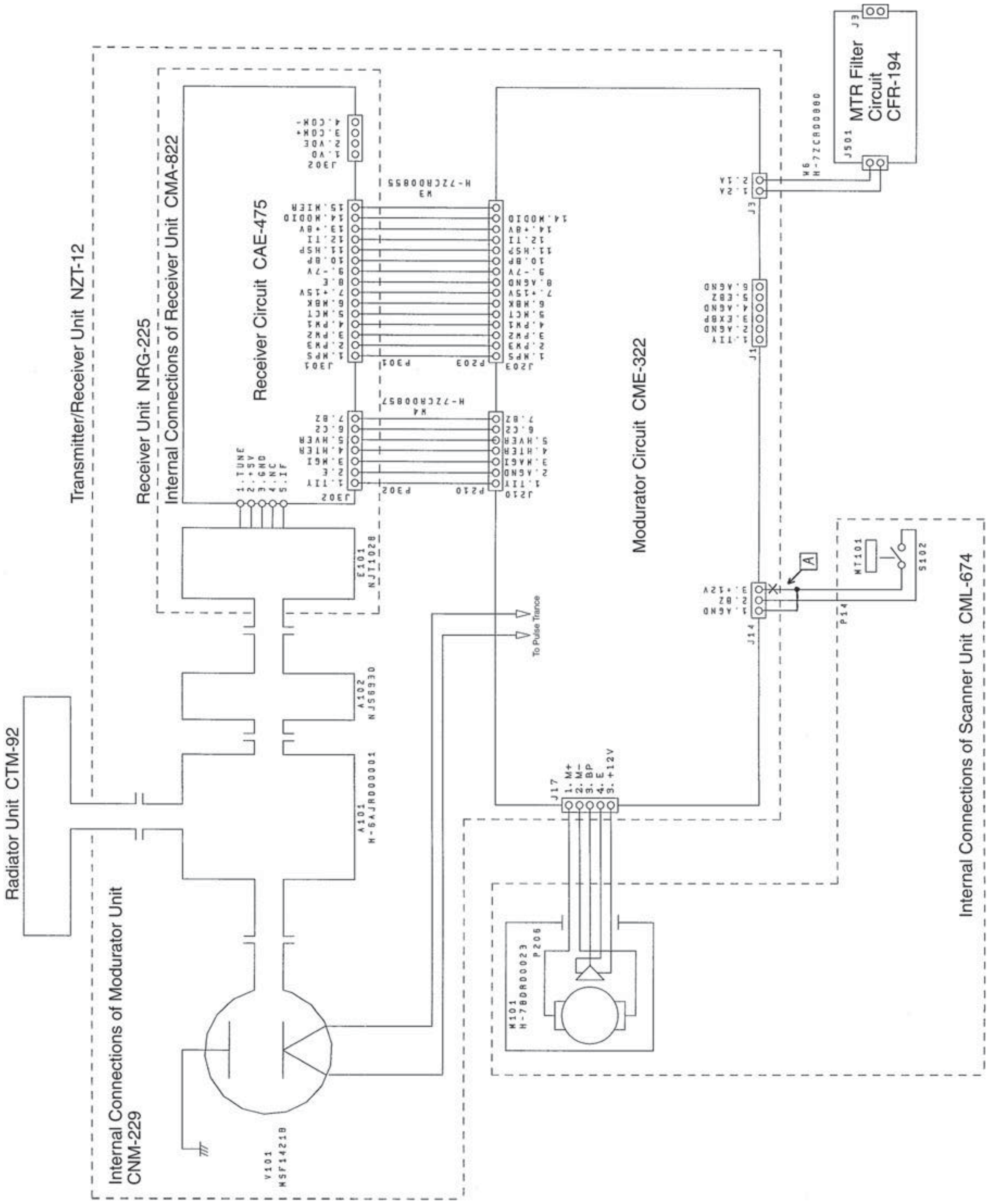


Figure 7.3-6 Inter-Unit Connection Diagram of the JMA-3355-7/9



7.4 Unit Internal Connection Diagrams

Figure 7.4-1 Internal Connection Diagram of the Scanner Unit NKE-2042



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Figure 7.4-2 Internal Connection Diagram of the Scanner Unit NKE-2043

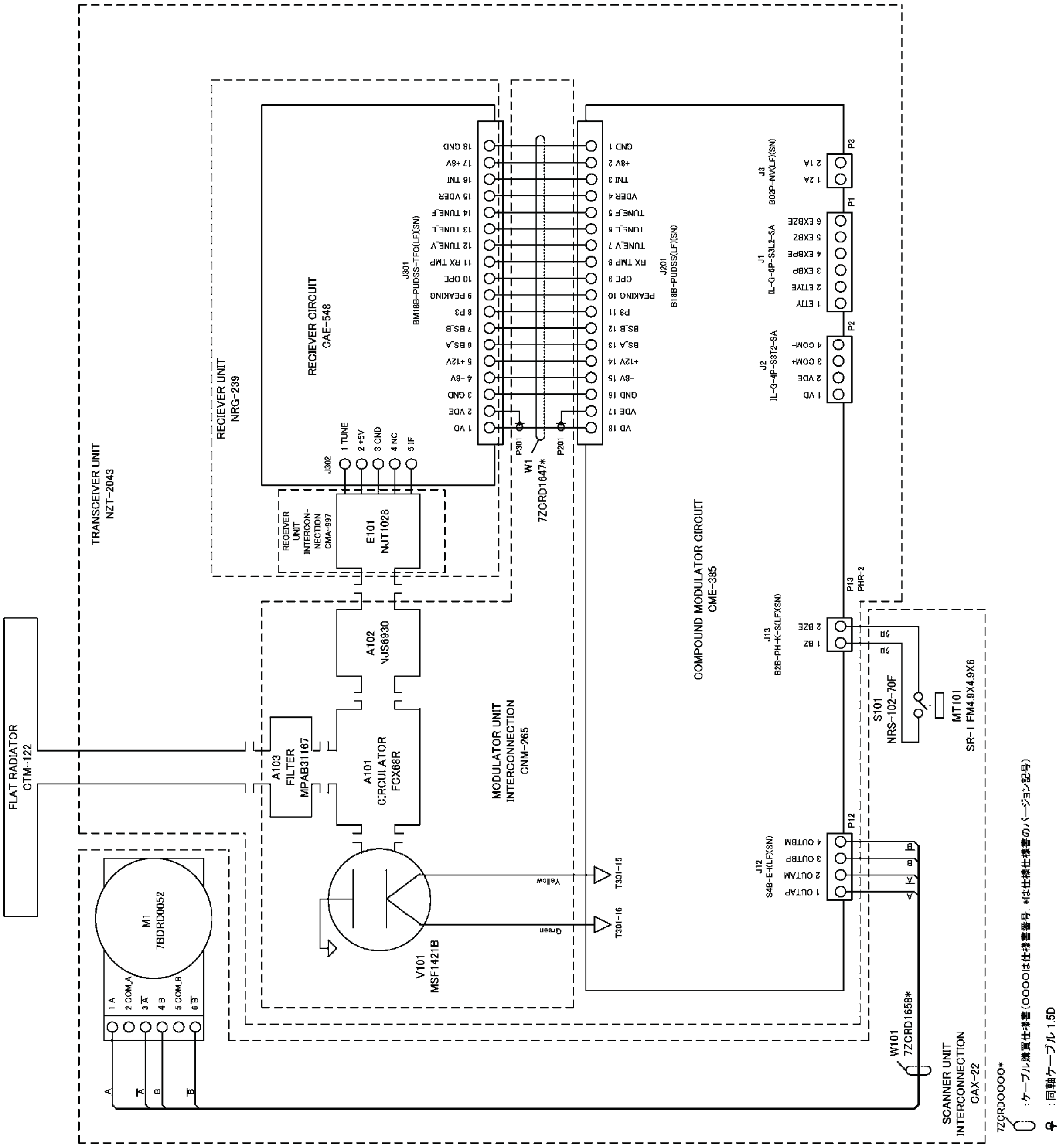
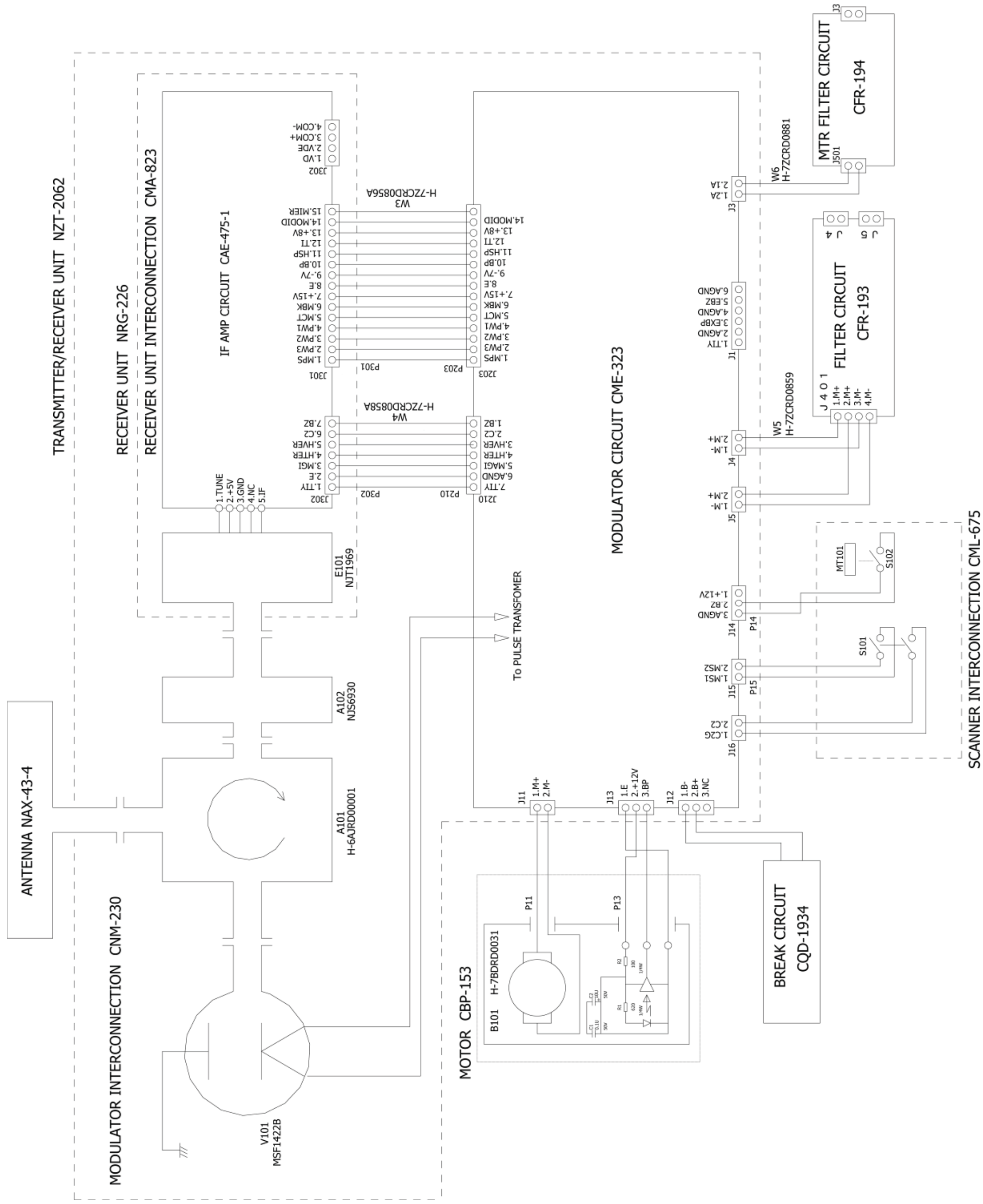


Figure 7.4-3 Internal Connection Diagram of the Scanner Unit NKE-2062



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Figure 7.4-4 Internal Connection Diagram of the Scanner Unit NKE-2062HS

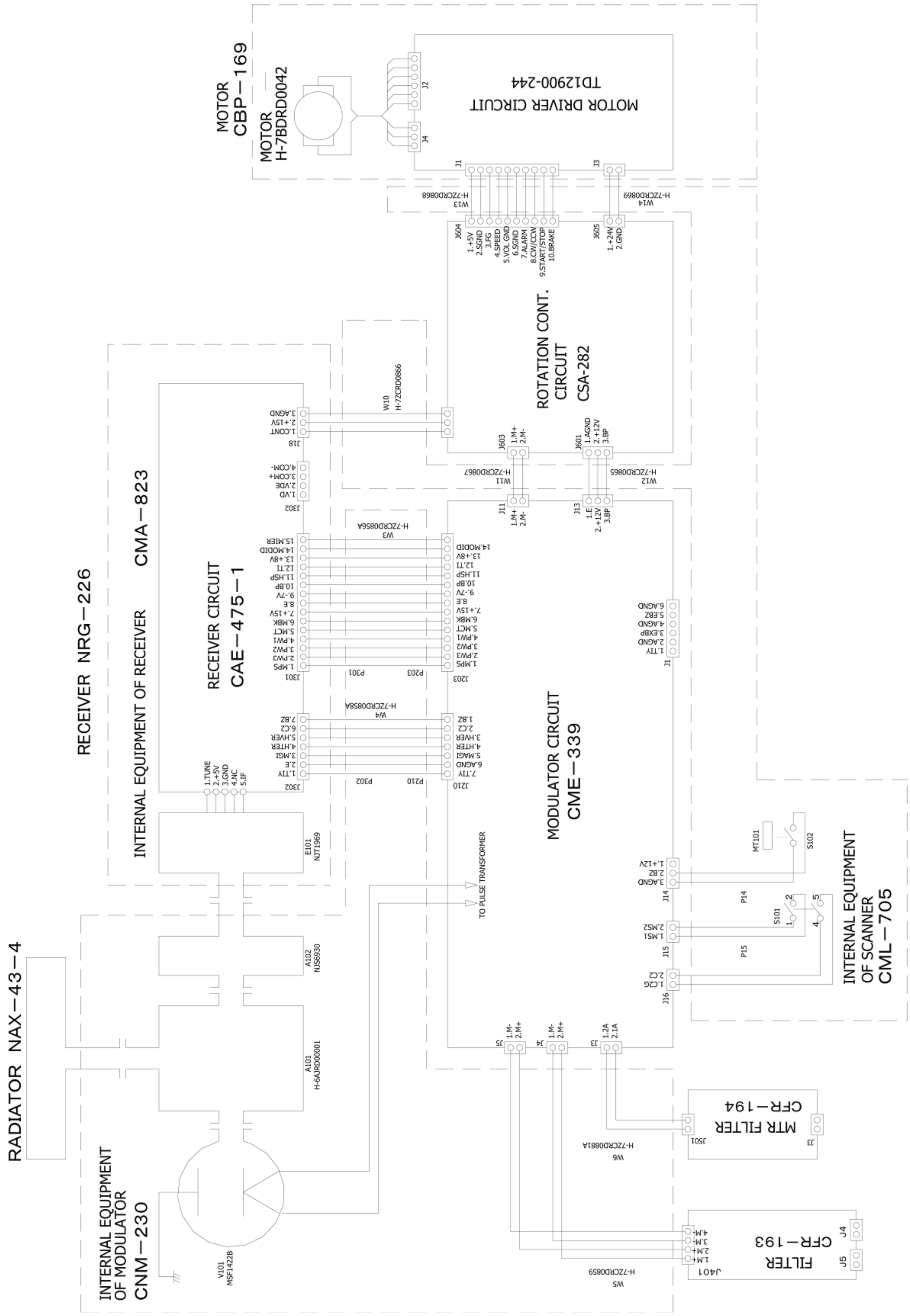


Figure 7.4-5 Internal Connection Diagram of the Scanner Unit NKE-2063

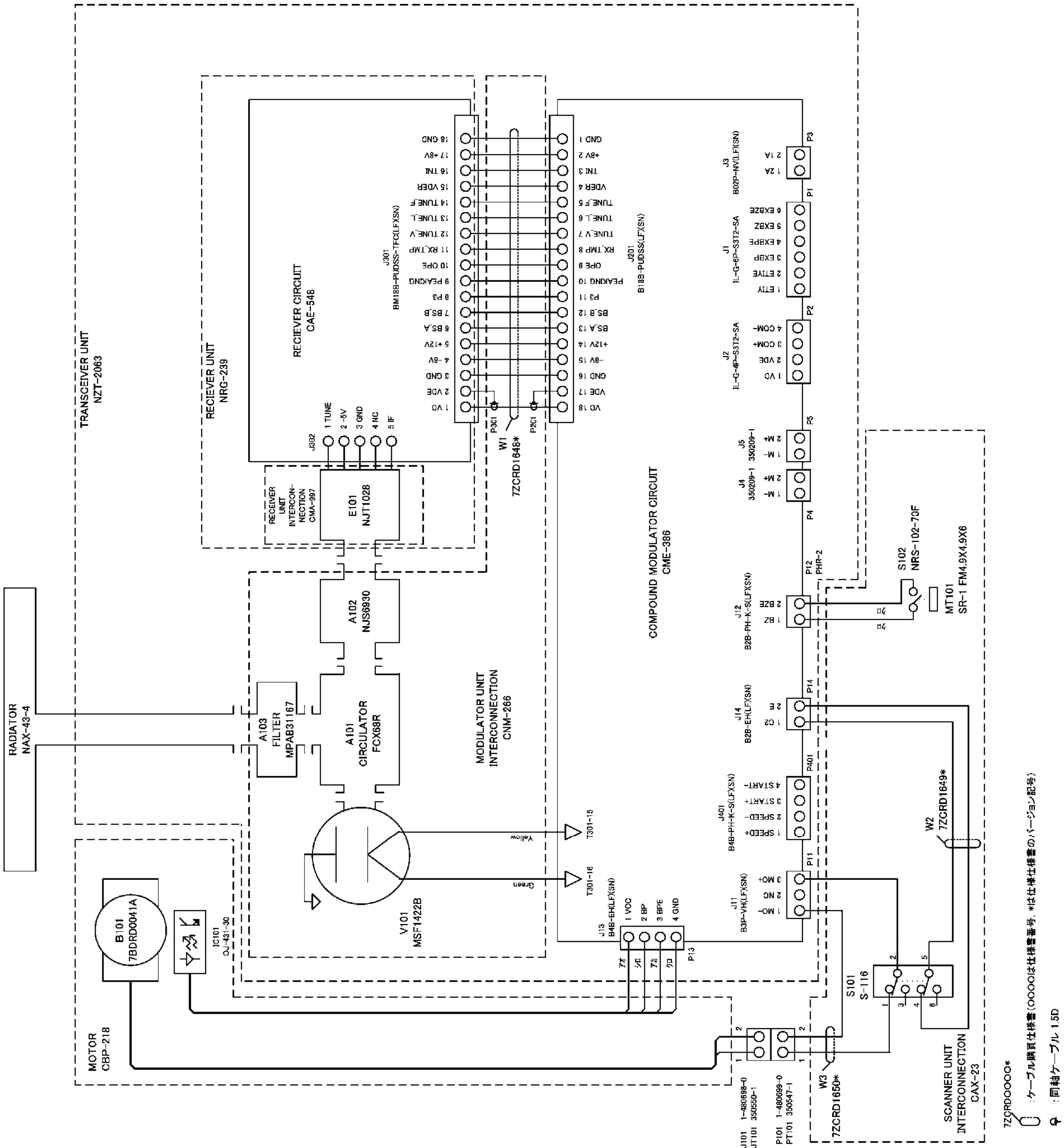


Figure 7.4-6 Internal Connection Diagram of the Scanner Unit NKE-2063HS

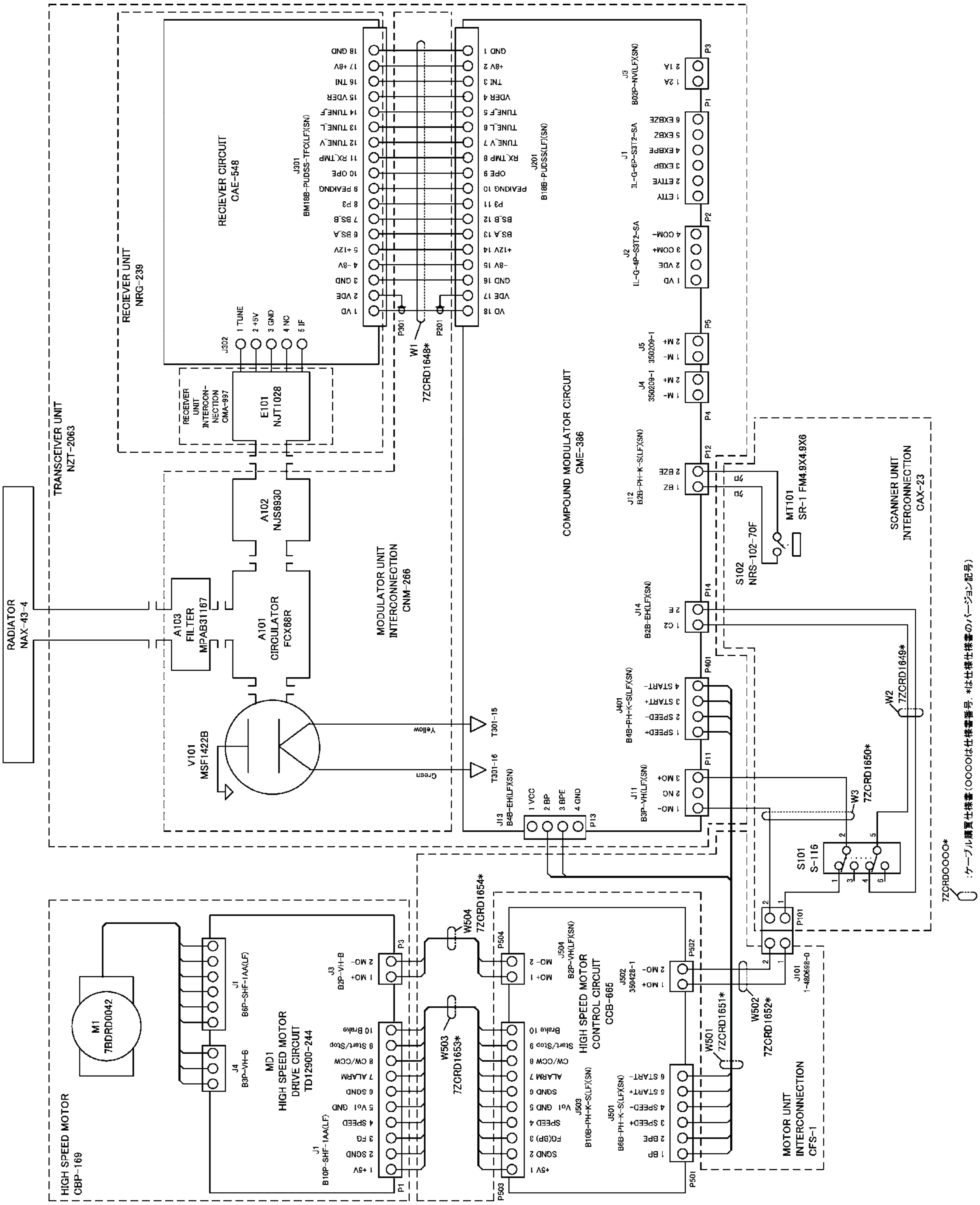


Figure 7.4-7 Internal Connection Diagram of the Scanner Unit NKE-2103-4/4HS/6/6HS

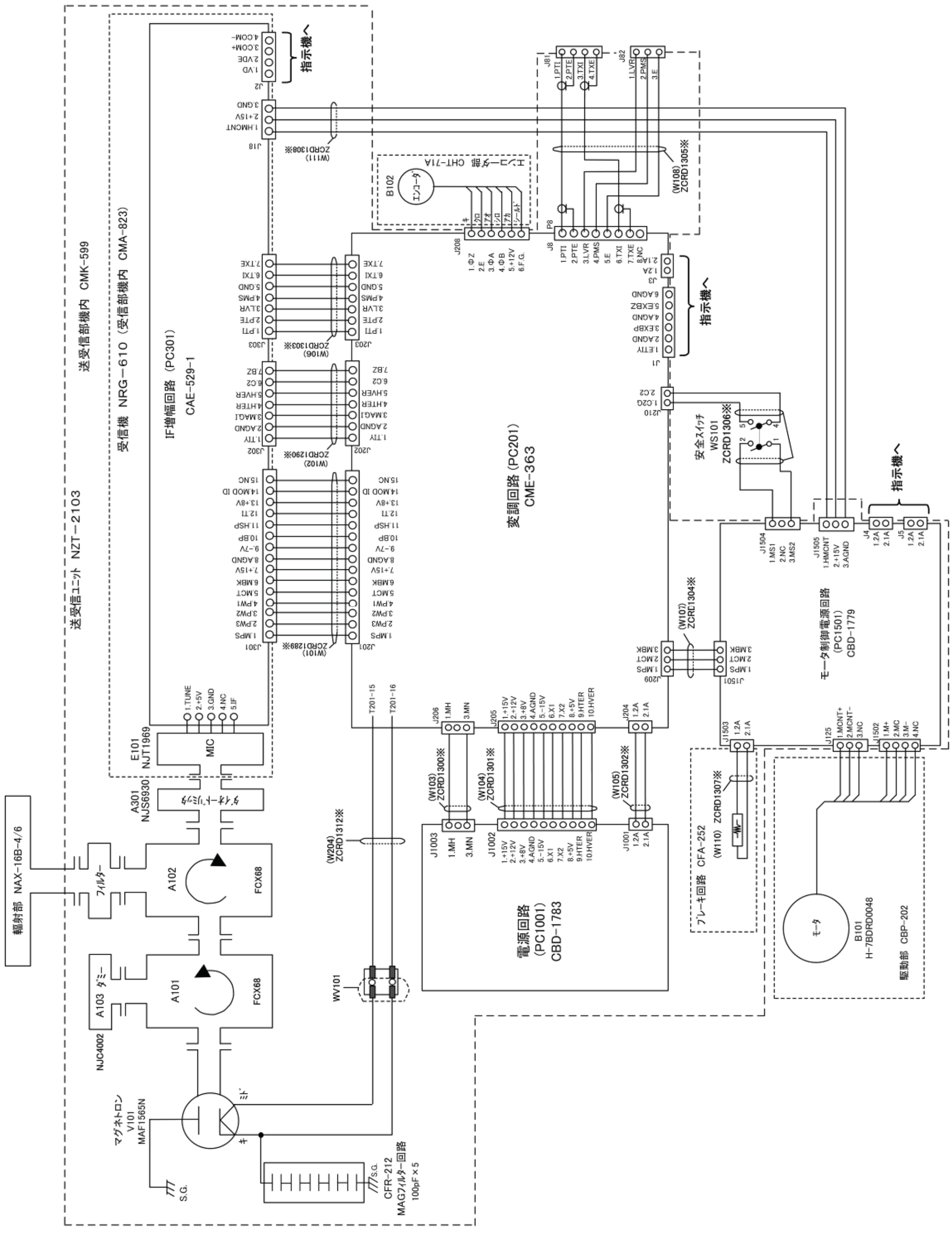


Figure 7.4-8 Internal Connection Diagram of the Scanner Unit NKE-2254-7/9

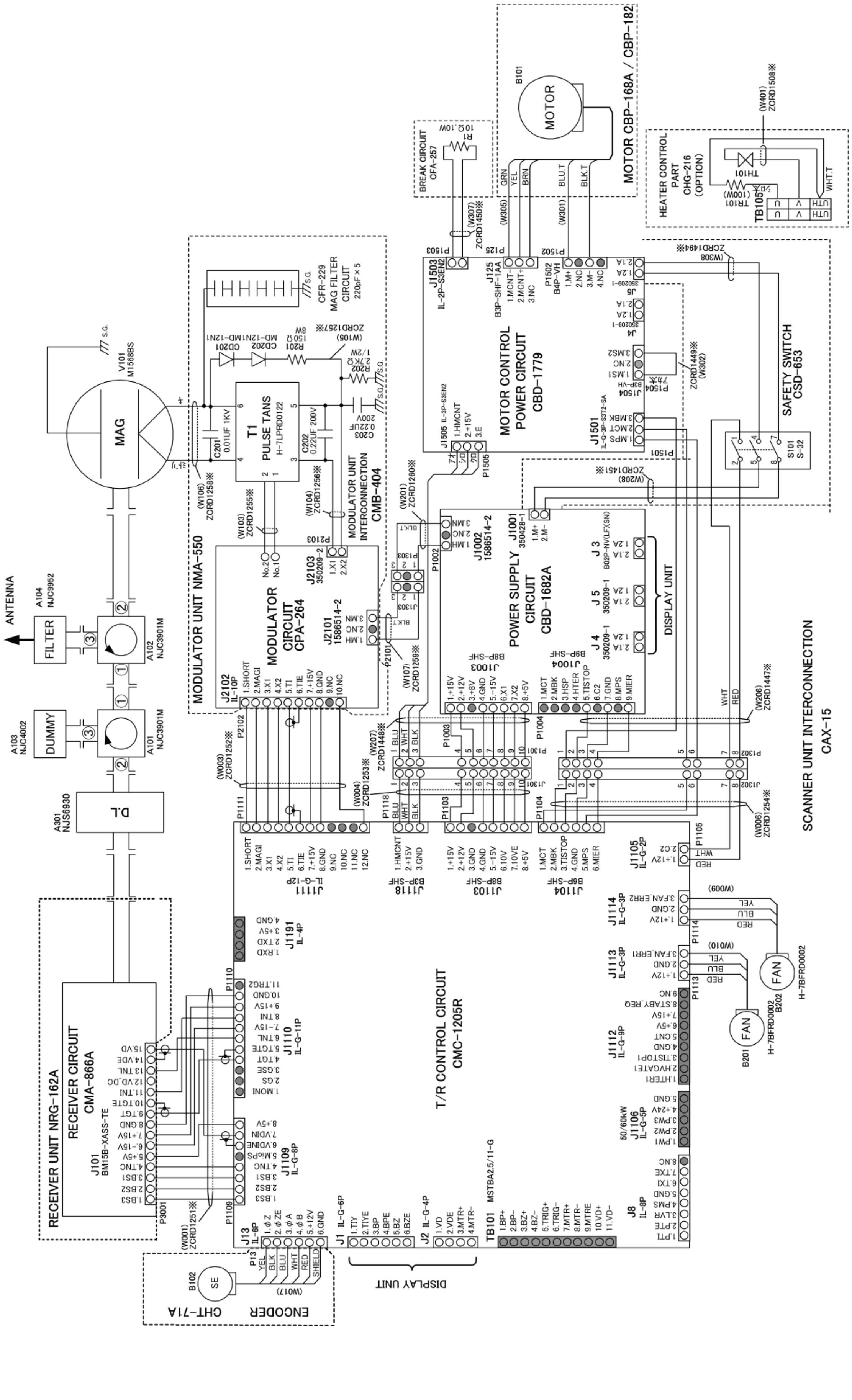
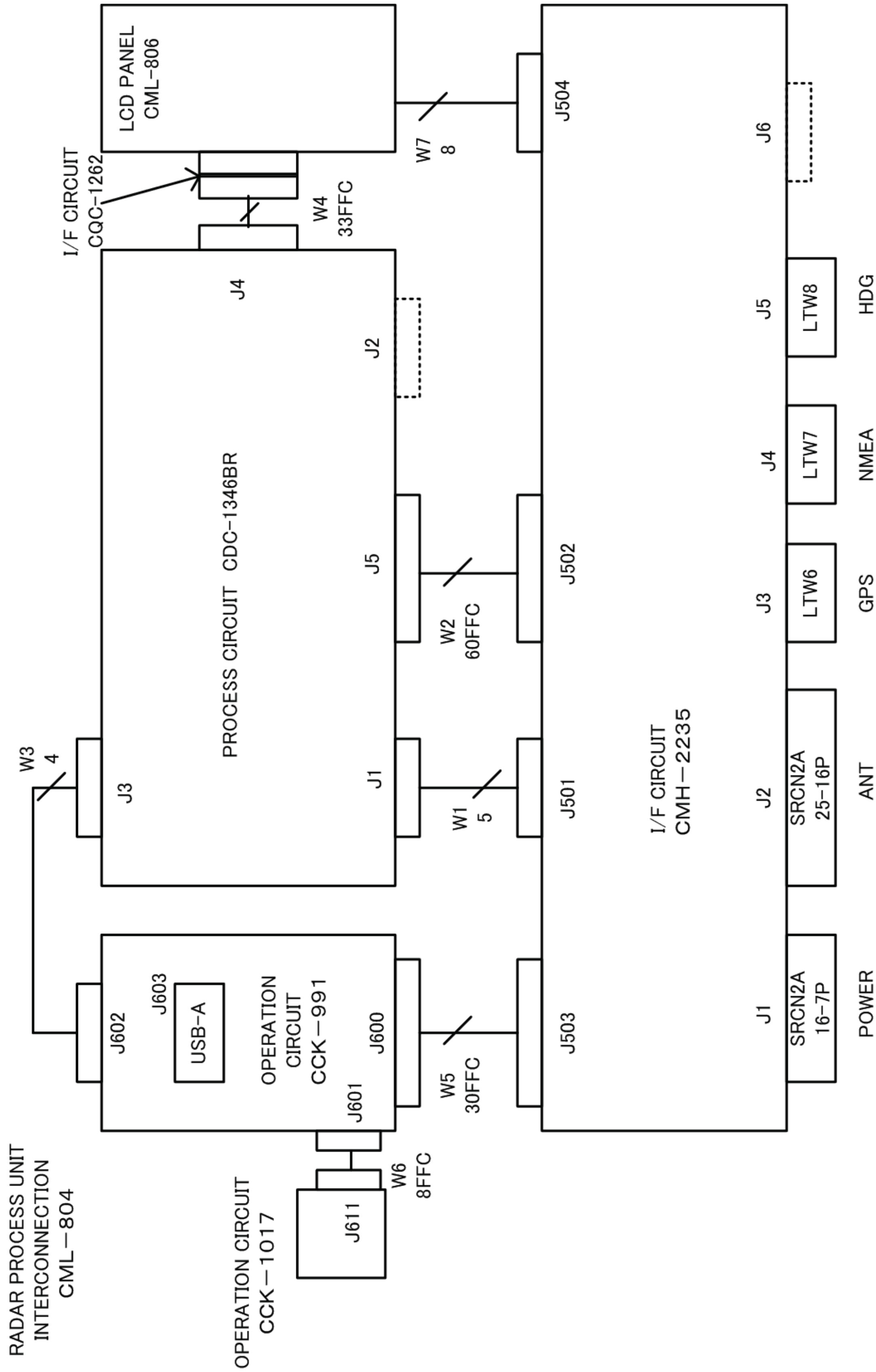


Figure 7.4-9 Internal Connection Diagram of the Display Unit NCD-2182



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